XF-5000

US Model

'**Dolby**' and the double-D symbol are the trade marks of Dolby Laboratories. Noise reduction system manufactured under license from Dolby Laboratories.

PORTABLE COMPONENT

SPECIFICATIONS

AUDIO POWER SPECIFICATIONS

POWER OUTPUT AND TOTAL HARMONIC DISTORTION

With 4 ohm loads, both channels driven, from 40–12,500Hz; rated 40 watts per channel minimum RMS power, with no more than 2.0% total harmonic distortion.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

WARNING!!

THIS SET USES THE SWITCHING-TYPE POWER-SUPPLY CIRCUIT, WHICH IS DIRECTLY CONNECTED TO THE AC POWER LINE. AN ISOLATION TRANSFORMER SHOULD BE USED DURING ANY SERVICE TO AVOID POSSIBLE SHOCK HAZARD.

OTHER SPECIFICATIONS

Power Amplifier Section

Circuit System:	Audio amplifier section: pulse-width modulation system Power supply section: pulse power supply
Inputs:	Phono inputs (phono jacks) sensitivity 1.5 mV input impedance 47 kΩ Mixing microphone input (minijack) for low impedance microphone
Outputs:	Tape recorder outputs (phono jacks) rated output 0.66 V (at load impedance 47 kΩ) load impedance 47 kΩ or higher Speaker outputs (speaker jacks) with the use of the supplied speaker connector speaker impedance 4 – 8 Ω Headphone output (stereo binaural jack) for 8 Ω impedance headphones
Other Connector:	Ground terminal for phono inputs
Audio Muting Effect:	13.5 dB

– Continued on next page –

MICROFILM

SONY®

SERVICE MANUAL

FM Tuner Section

System:	FM superheterodyne tuner, Quartz-locked synthesizer system
Tuning Range:	87.5 – 108 MHz
Antennas:	Telescopic antenna External antenna connector for external FM antenna and car antenna 75 Ω, unbalanced
Intermediate Frequency:	10.7 MHz
Sensitivity at 50dB Quieting:	3 μV
Signal-to-noise Ratio:	60 dB
Selectivity:	92 dB at 400 kHz
Harmonic Distortion at 1kHz:	0.2 % (mono), 0.5 % (stereo)
Separation:	42 dB at 1 kHz
Frequency Response:	40 – 12,500 Hz
Capture Ratio:	3 dB
AM Suppression Ratio:	50 dB

Cassette Player Section

Tape:	Prerecorded tape cassette
Head:	Playback head
Tape Track:	4-track 2-channel stereo
Frequency Response:	40 – 14,000 Hz
Signal-to-noise Ratio:	52 dB Dolby effect 8 dB
Tone Controls:	Bass ± 8 dB at 100 Hz Treble ± 8 dB at 10 kHz
Loudness (att. 30dB)**:**	+6 dB at 100 Hz, 10 kHz
Wow and Flutter:	Less than 0.12 % (WRMS)
Fast Winding Time:	Approx. 2 min. (with C-60)

General

Power Requirements:	120 V ac, 60 Hz 12 V dc car battery (negative ground) 12 V dc with the supplied BP-70 Rechargeable Battery Pack
Power Consumption:	68 W ac
Dimensions:	Approx. 170 (w) x 235 (h) x 279 (d) mm 6¾(w) x 9⅜ (h) x 11 inches) including projecting parts and controls, not including carrying handles
Weight:	Approx. 9.8 kg (21 lb 10 oz) not including supplied accessories Approx. 11.1 kg (24 lb 8 oz) including battery pack

Measured at 14.4 V

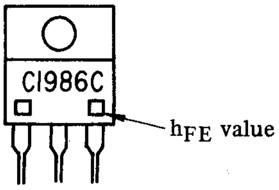
◆ ◆ ◆

SERVICING NOTES

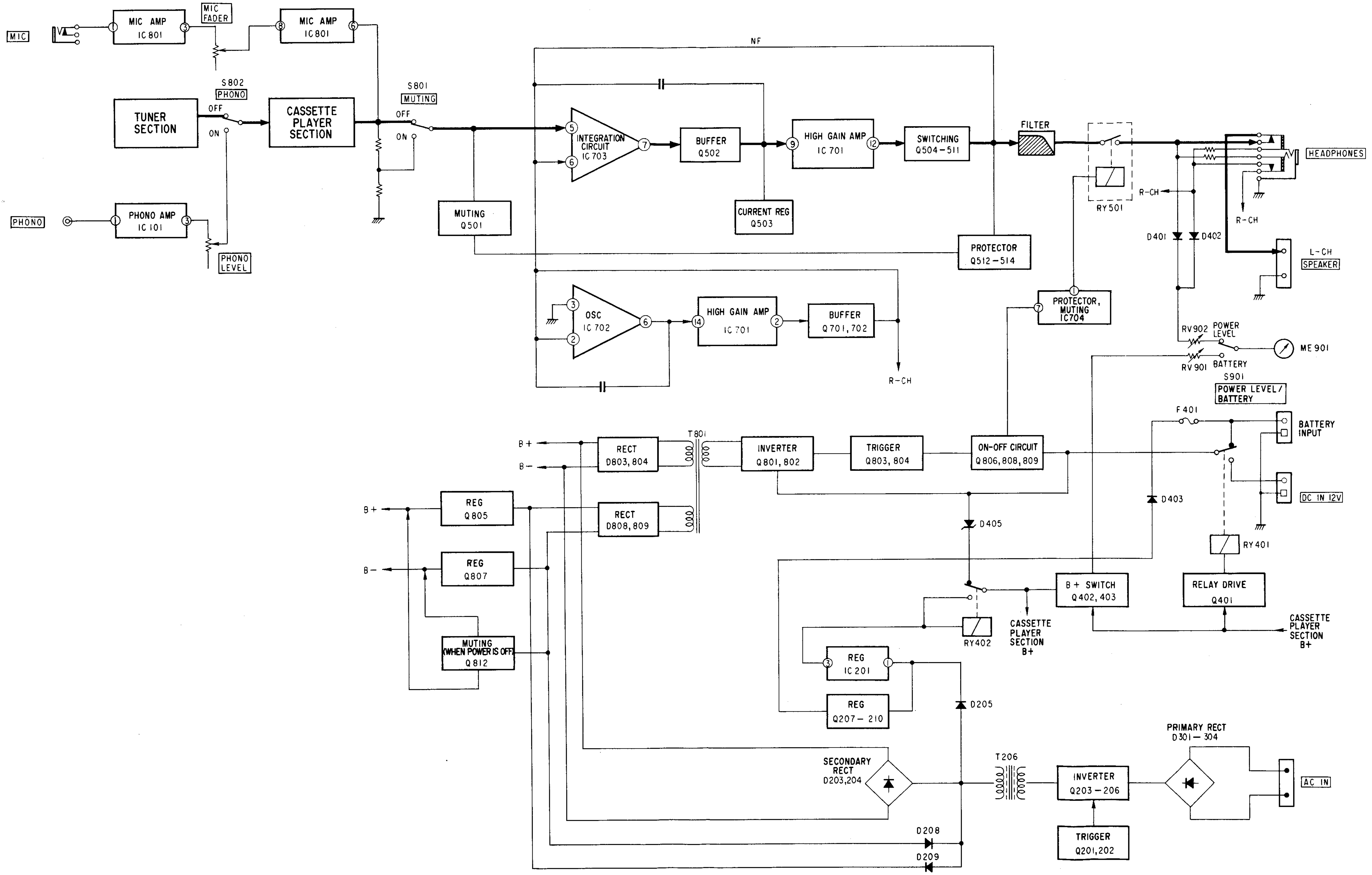
INVERTER CIRCUIT TRANSISTOR REPLACEMENT (Q203 – 206)

When replacing Q203 – 206 in the inverter circuit, use those which have the same h_{FE} values.

Q203 – 206 : 2SC1986C



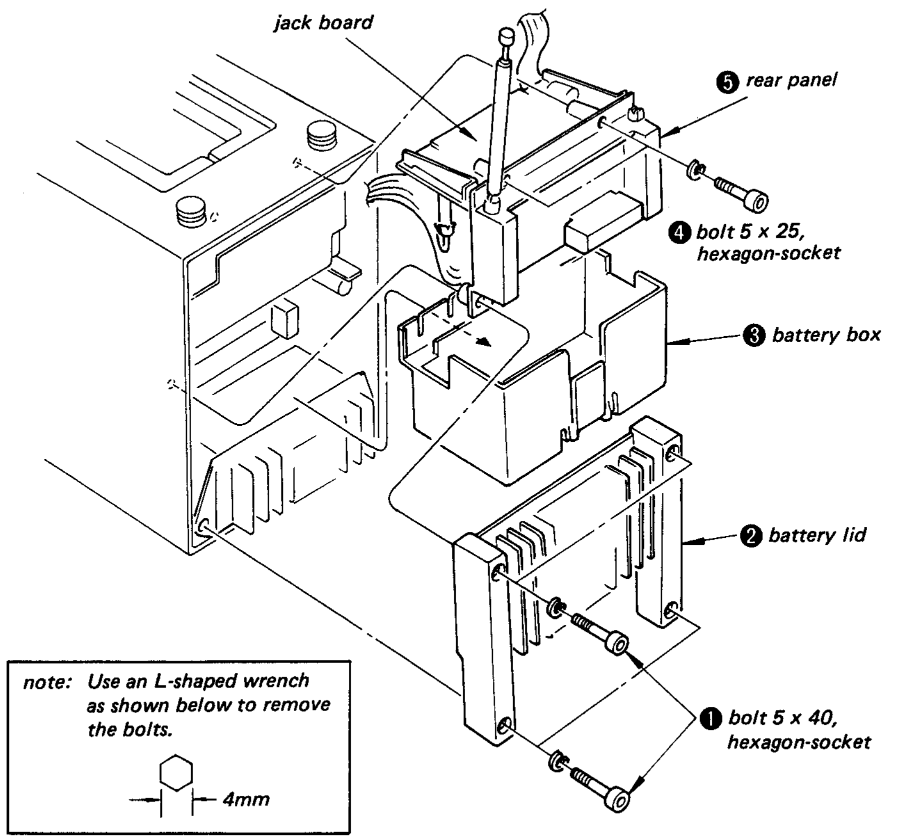
SECTION 1
BLOCK DIAGRAM


MIC
MIC AMP IC801
MIC FADER
MIC AMP IC801
TUNER SECTION
S802
PHONO
OFF
ON
CASSETTE PLAYER SECTION
S801
MUTING
OFF
ON
NF
INTEGRATION CIRCUIT IC703
BUFFER Q502
HIGH GAIN AMP IC701
SWITCHING Q504–511
FILTER
HEADPHONES
RY501
R-CH
R-CH
D401
D402
L-CH
SPEAKER
PHONO
PHONO AMP IC101
PHONO LEVEL
MUTING Q501
CURRENT REG Q503
PROTECTOR Q512–514
PROTECTOR, MUTING IC704
OSC IC702
HIGH GAIN AMP IC701
BUFFER Q701,702
R-CH
RV902
POWER LEVEL
RV901
BATTERY
ME901
S901
POWER LEVEL/ BATTERY
F401
BATTERY INPUT
DC IN 12V
B+
B−
RECT D803,804
T801
INVERTER Q801,802
TRIGGER Q803,804
ON-OFF CIRCUIT Q806,808,809
B+
REG Q805
RECT D808,809
B−
REG Q807
D403
D405
RY401
B+ SWITCH Q402,403
RELAY DRIVE Q401
RY402
CASSETTE PLAYER SECTION B+
CASSETTE PLAYER SECTION B+
MUTING (WHEN POWER IS OFF) Q812
REG IC201
REG Q207–210
D205
PRIMARY RECT D301–304
SECONDARY RECT D203,204
T206
INVERTER Q203–206
AC IN
TRIGGER Q201,202
D208
D209

SECTION 2
DISASSEMBLY

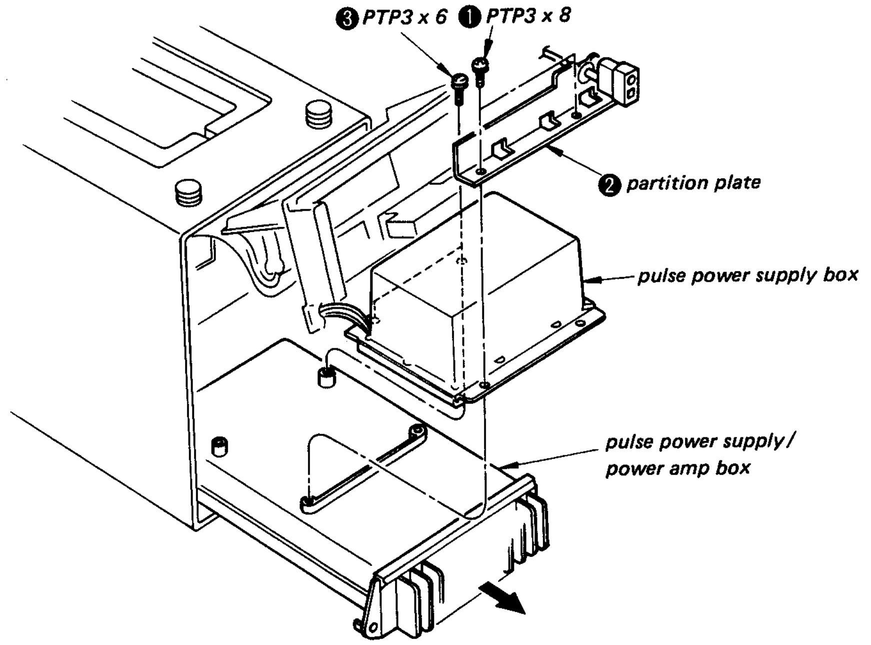
Note: Follow the disassembly procedure in the numerical order given.

REAR PANEL
(The jack board can be checked.)

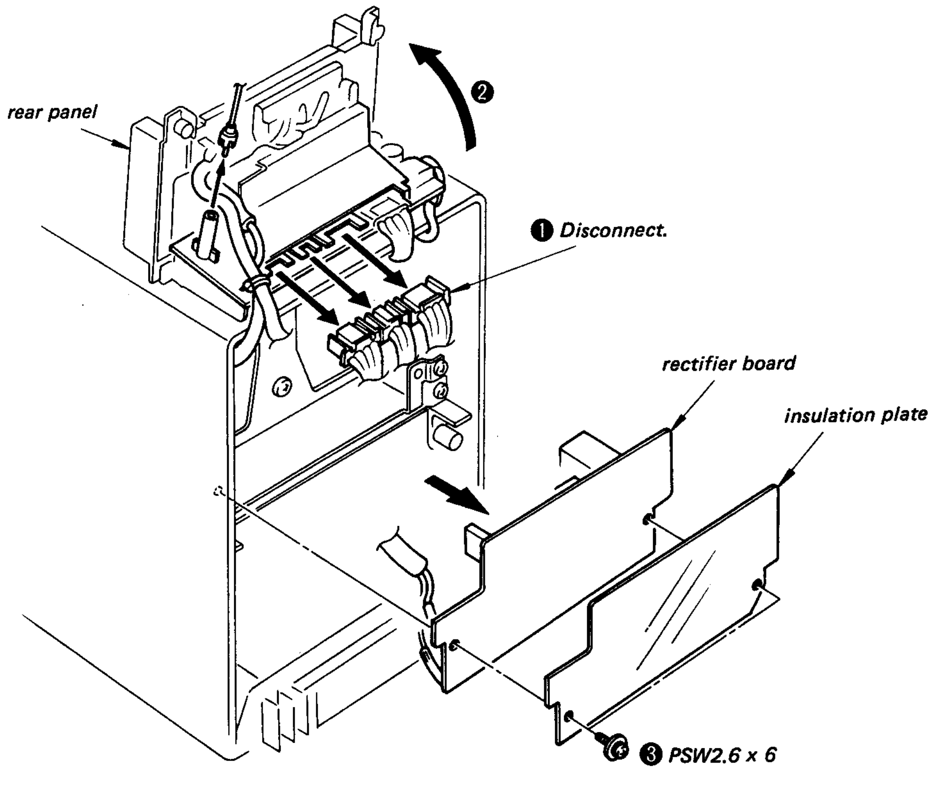

jack board
❺ rear panel
❹ bolt 5 x 25, hexagon-socket
❸ battery box
❷ battery lid
❶ bolt 5 x 40, hexagon-socket
4mm

note: Use an L-shaped wrench as shown below to remove the bolts.

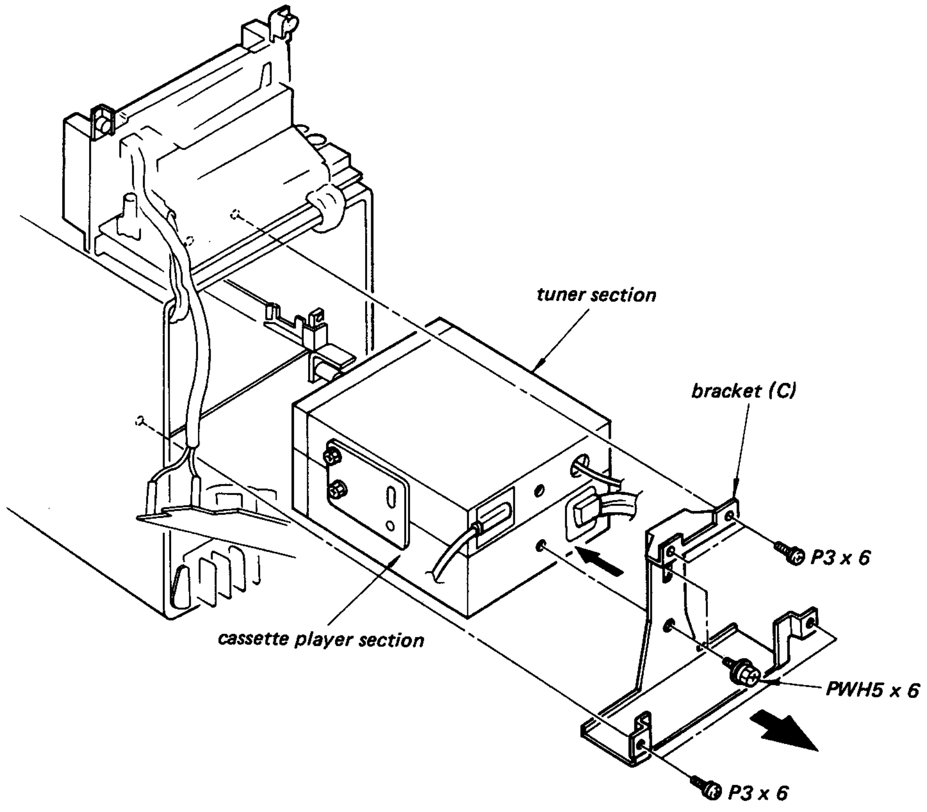
PULSE POWER SUPPLY BOX


❸ PTP3 x 6
❶ PTP3 x 8
❷ partition plate
pulse power supply box
pulse power supply/
power amp box

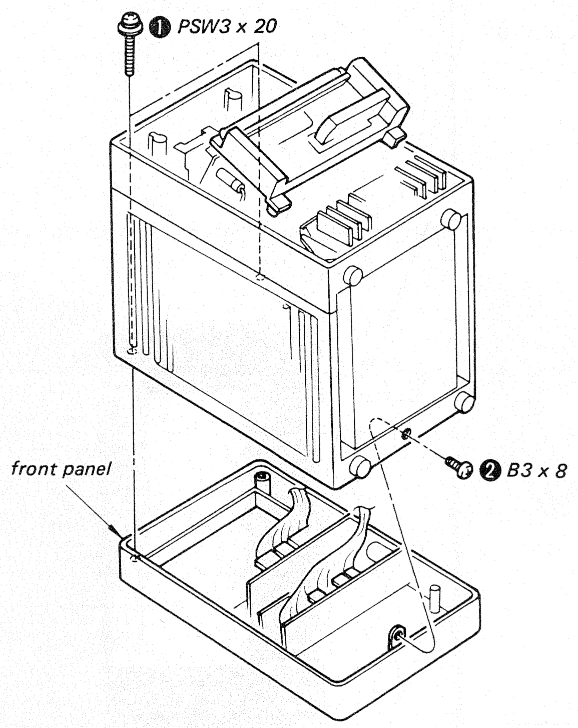
RECTIFIER BOARD


rear panel
❷
❶ Disconnect.
rectifier board
insulation plate
❸ PSW2.6 x 6

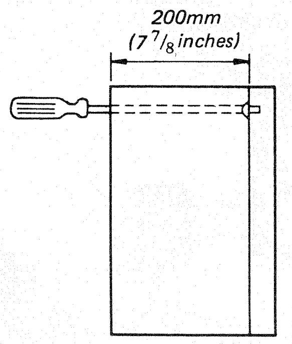
TUNER AND CASSETTE PLAYER SECTION


tuner section
bracket (C)
P3 x 6
cassette player section
PWH5 x 6
P3 x 6

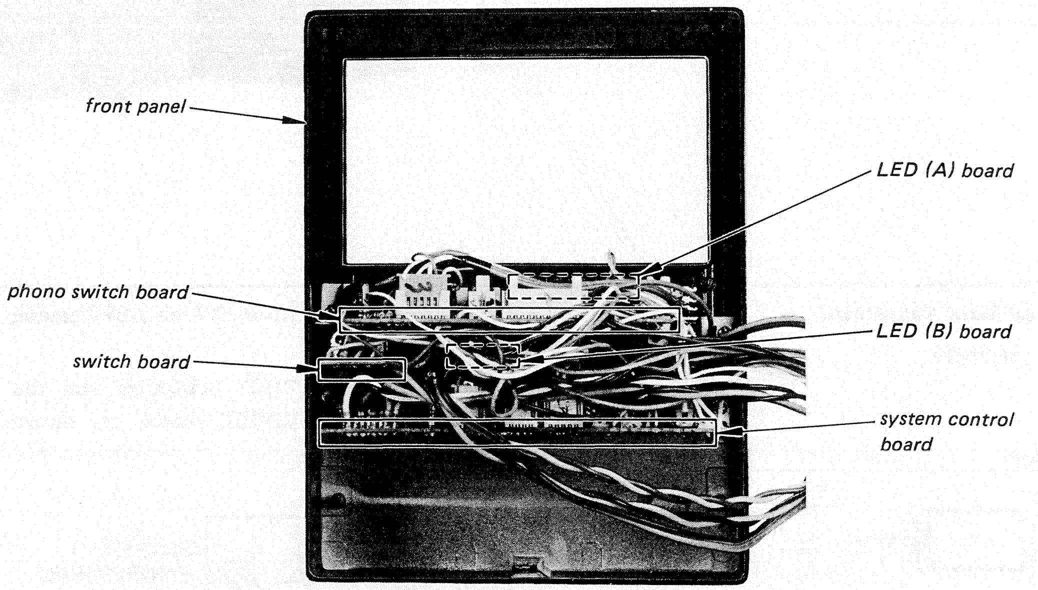
FRONT PANEL


❶ PSW3 x 20
front panel
❷ B3 x 8

note: Use a screwdriver as shown below to remove the screws ❶.


200mm
(7 7/8 inches)

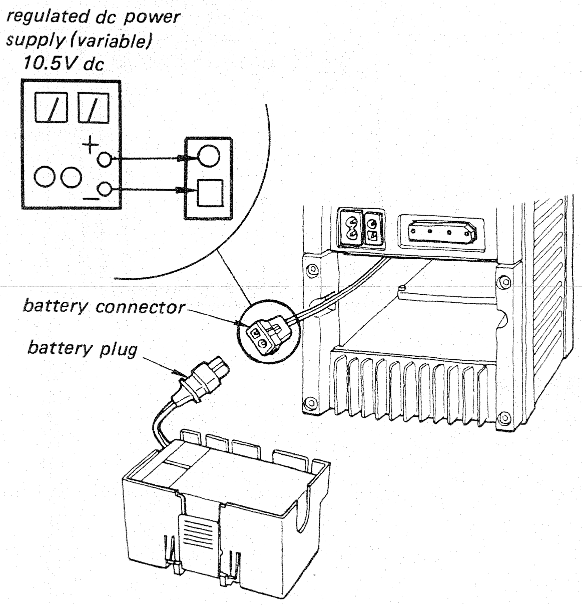
· **Each board can be checked.**


front panel
LED (A) board
phono switch board
LED (B) board
switch board
system control board

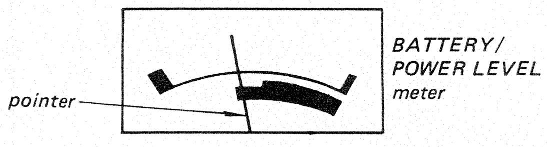
SECTION 3
ADJUSTMENTS

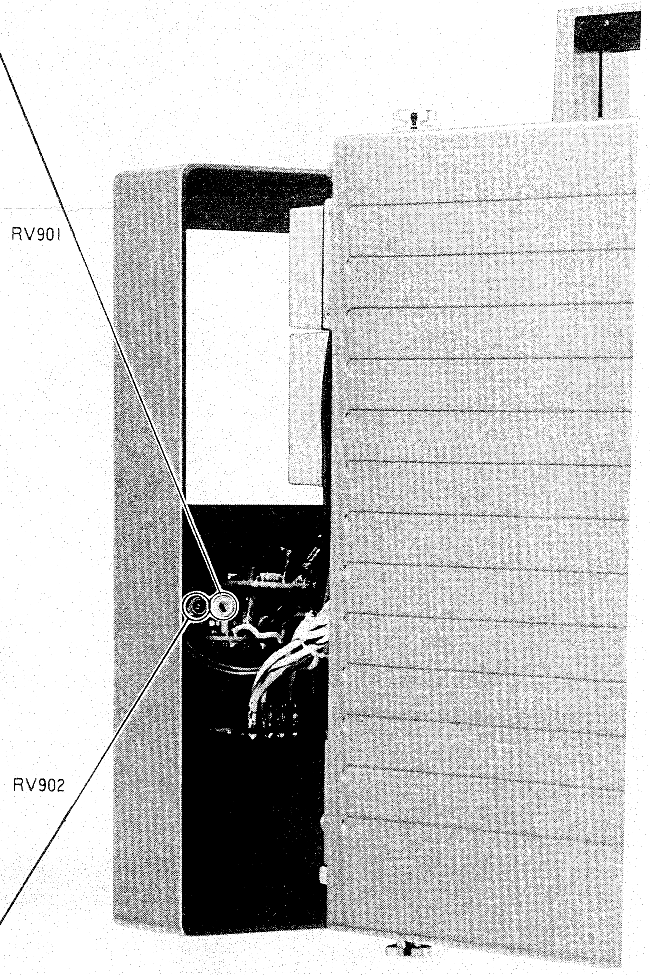
Battery Meter Adjustment

1. Supply 10.5V dc to the battery connector as shown below.


regulated dc power
supply (variable)
10.5V dc
+
–
battery connector
battery plug

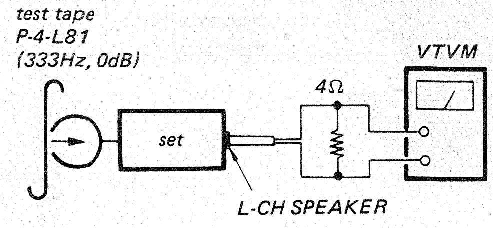
2. BATTERY/POWER LEVEL switch: BATTERY
3. Adjust RV901 for specified pointer position on the BATTERY/POWER LEVEL meter as shown below.


pointer
BATTERY/
POWER LEVEL
meter

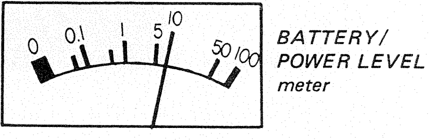

RV901
RV902

Power Level Meter Adjustment

1. Mode: playback

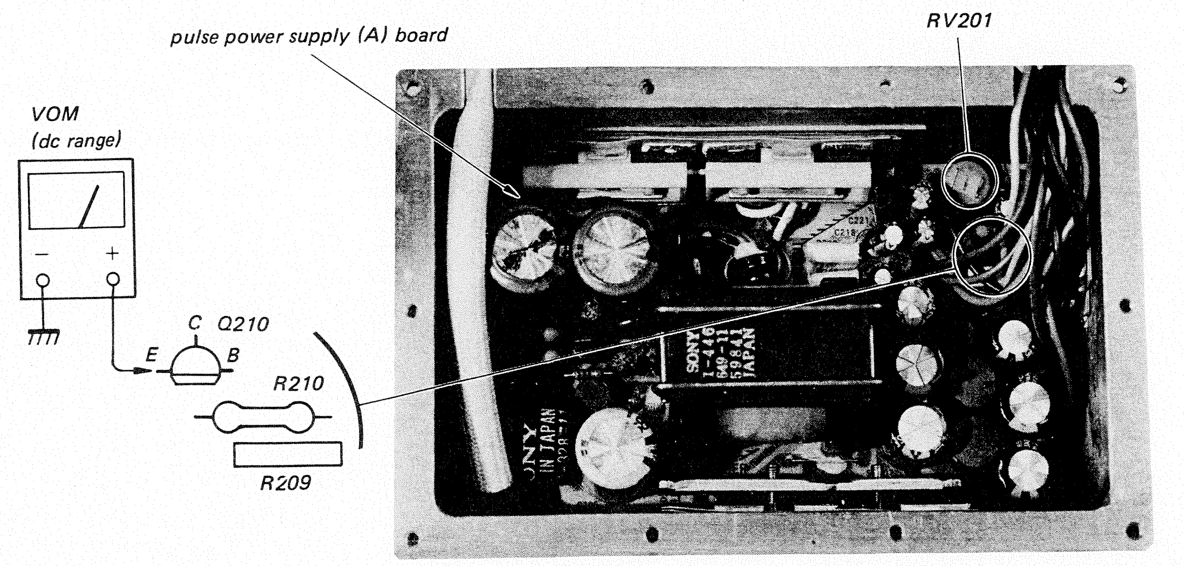

test tape
P-4-L81
(333Hz, 0dB)
set
4Ω
VTVM
L-CH SPEAKER

2. Turn the VOL control for 6.32V ac (10W) reading on the VTVM.
3. Adjust RV902 for "10" indication on the BATTERY/POWER LEVEL meter as shown below.


0
0.1
1
5
10
50
100
BATTERY/
POWER LEVEL
meter

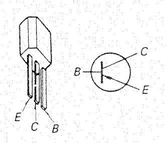
DC Voltage Adjustment (Power Supply : AC IN)

1. Connect a VOM as shown below.
2. Adjust RV201 for 14.8V dc reading on the VOM.

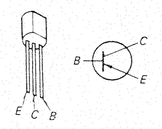

pulse power supply (A) board
RV201
VOM
(dc range)
−
+
C Q210
E
B
R210
R209

Semiconductor Lead Layouts

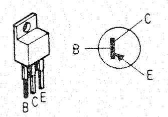
2SA677
2SA678
2SA1027R



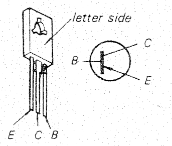
2SA733
2SA772
2SA772-23



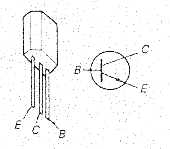
2SA1077



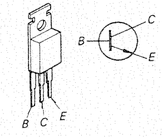
2SA899
2SB648
2SB649A


letter side
C
B
E
E C B

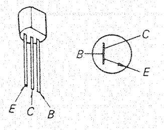
2SC633A



2SC1061
2SC1986C
2SC2767

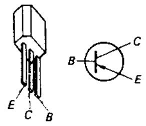


2SC1364
2SC1474
2SD666
2SD666A

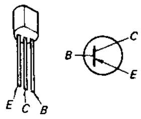


Semiconductor Lead Layouts

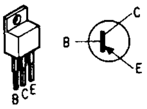
2SA677
2SA678
2SA1027R



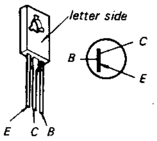
2SA733
2SA772
2SA772-23



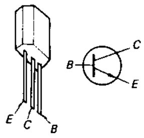
2SA1077



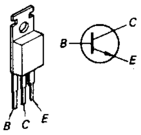
2SA899
2SB648
2SB649A


letter side
C
B
E
E
C
B

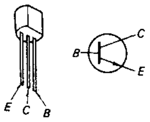
2SC633A



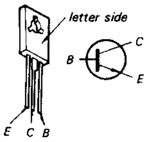
2SC1061
2SC1986C
2SC2767



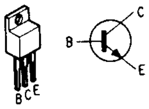
2SC1364
2SC1474
2SD666
2SD666A



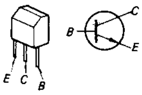
2SC1904
2SD668
2SD669
2SD669A


letter side
C
B
E
E
C
B

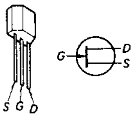
2SC2527
2SD1049



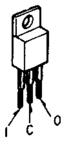
2SD773



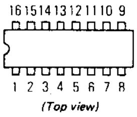
2SK23
2SK105A



µPC14312H

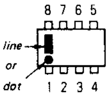


µPD4050C
TC4050BP


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

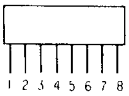
(Top view)

TL081
TL081CP
TL082CP


8 7 6 5
line
or
dot
1 2 3 4

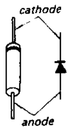
(Top view)

HA12002

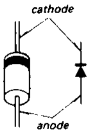


(Marking side view)

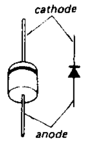
1S1555
RD5.6E-Z7S
RD7.5E
RD7.5E-B
RD16E
RD16E-B


cathode
anode

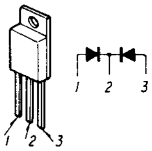
1S1585


cathode
anode

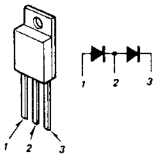
1S2348H
1SS82


cathode
anode

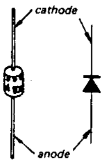
CTU21S



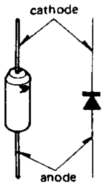
CTU22U
CTU31U



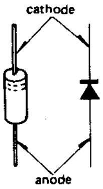
ERA81-004


cathode
anode

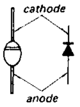
ERB81-004


cathode
anode

ERD33-02

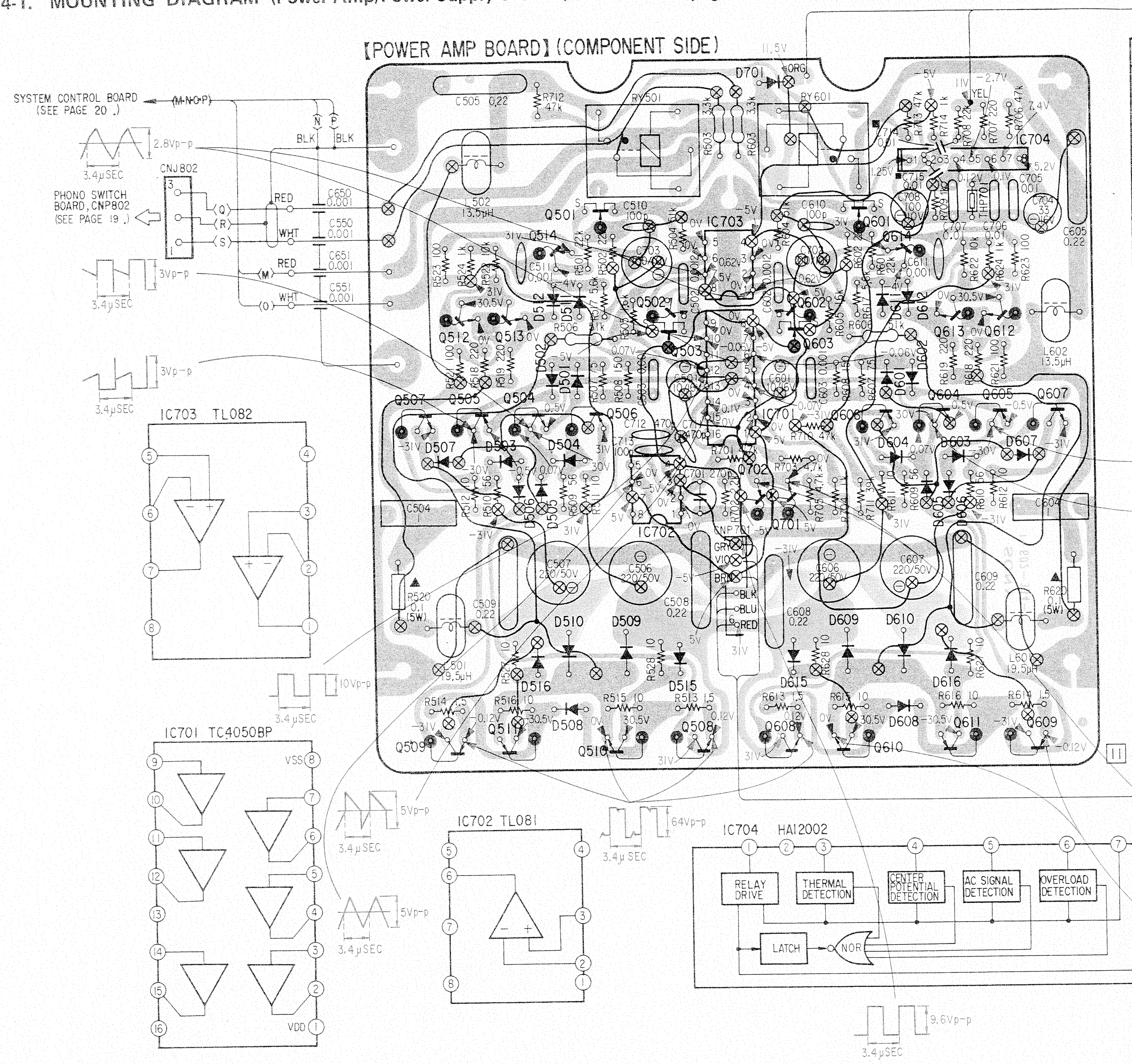

cathode
anode

V09C

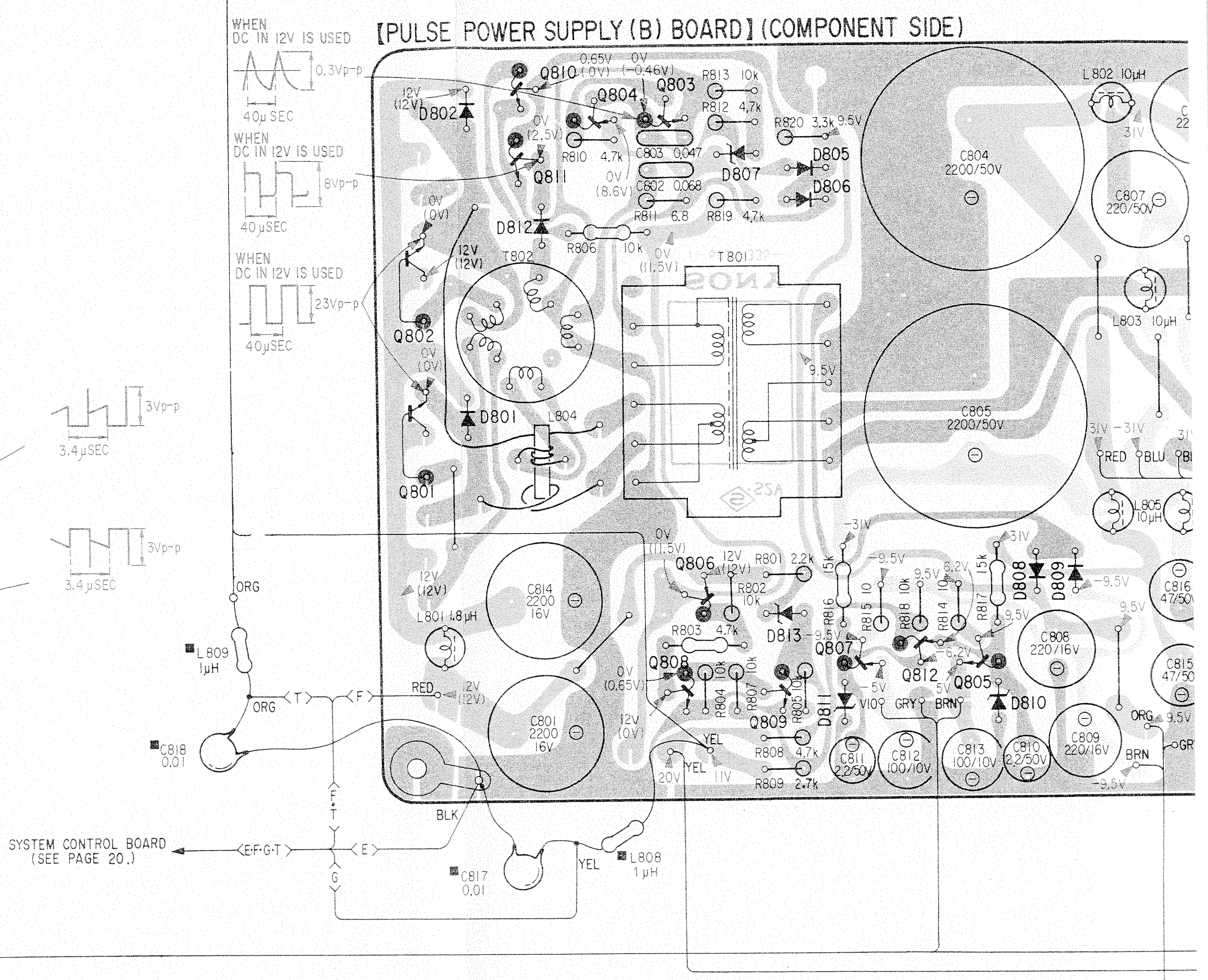

cathode
anode

SECTION 4
DIAGRAMS

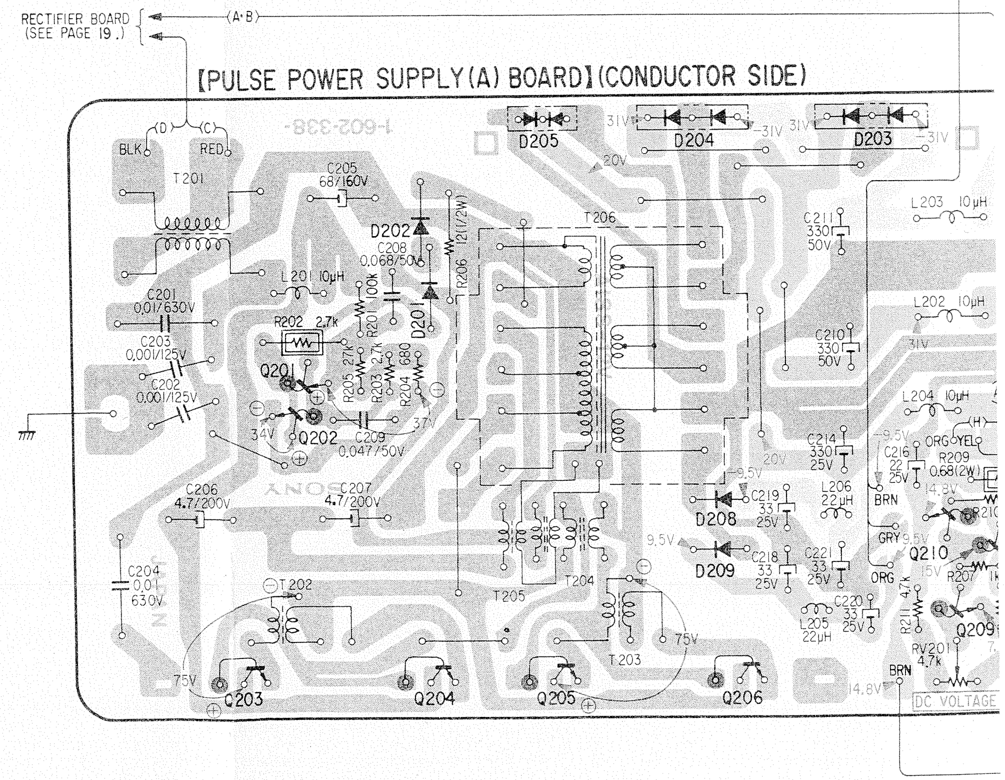
4-1. MOUNTING DIAGRAM (Power Amp/Power Supply Section) ● Refer to page 11 for semiconductor lead layouts.


【POWER AMP BOARD】(COMPONENT SIDE)
SYSTEM CONTROL BOARD (SEE PAGE 20.)
PHONO SWITCH BOARD, CNP802 (SEE PAGE 19.)
CNJ802
2.8Vp-p
3.4μSEC
3Vp-p
10Vp-p
5Vp-p
64Vp-p
9.6Vp-p
RY501
RY601
IC703 TL082
IC701 TC4050BP
IC702 TL081
IC704 HA12002
RELAY DRIVE
THERMAL DETECTION
CENTER POTENTIAL DETECTION
AC SIGNAL DETECTION
OVERLOAD DETECTION
LATCH
NOR
VSS
VDD

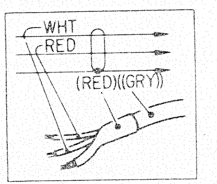
Q , IC	D
	701
IC704	
501 601	
514 614 IC703	
502,602 512,513 613,612 503,603	512,511 611,612
IC701	502,501,601,602
507,505,504,506 606,604,605,607	
	507,503,504 604,603,607
IC702 702,701	506,505,605,606
	516,510,509,515 615,609,610,616
	508 608
509,511,510,508 608,610,611,609	
Q , IC	D


【PULSE POWER SUPPLY (B) BOARD】(COMPONENT SIDE)
WHEN DC IN 12V IS USED
0.3Vp-p
8Vp-p
23Vp-p
40μSEC
3Vp-p
3.4μSEC
SYSTEM CONTROL BOARD (SEE PAGE 20.)
L809 1μH
C818 0.01
C817 0.01
L808 1μH
T802
T801
C804 2200/50V
C805 2200/50V
C814 2200 16V
C801 2200 16V

Q,IC	D
	205,204,203
	202
	201
201	
202	
207	208
210 208	
	209
209	
IC201	
203, 204 205, 206	206
Q,IC	D


RECTIFIER BOARD (SEE PAGE 19.)
【PULSE POWER SUPPLY (A) BOARD】(CONDUCTOR SIDE)
T201
T202
T203
T204
T205
T206
Q201
Q202
Q203
Q204
Q205
Q206
Q209
Q210
DC VOLTAGE

Note:
- Color code of sleeving over the end of the jacket.

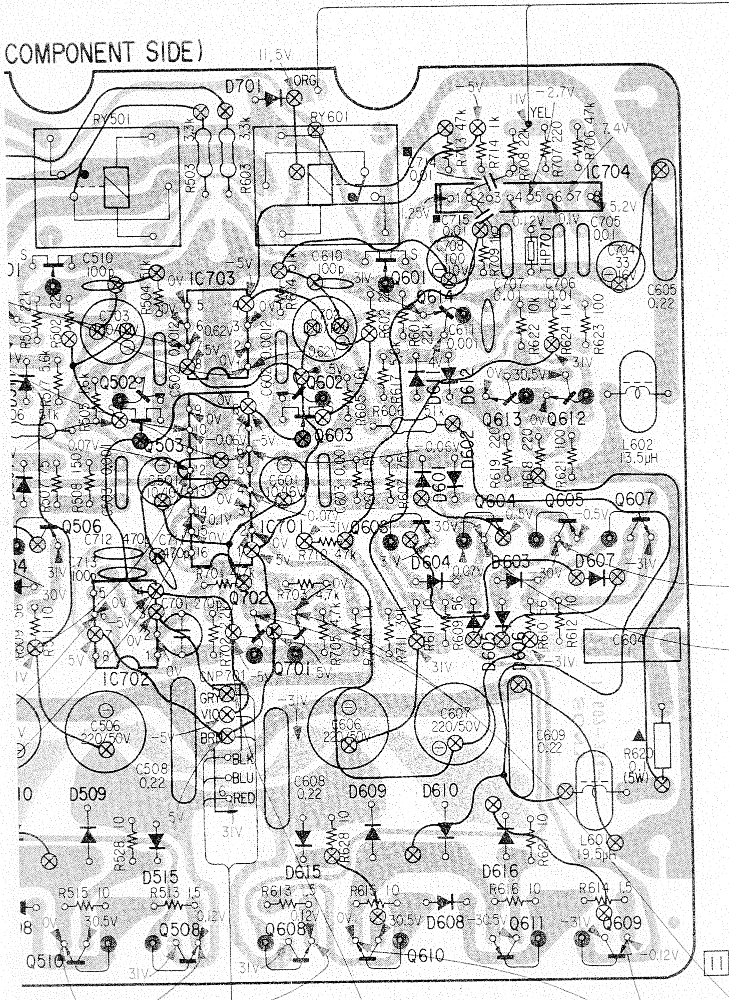

WHT
RED
(RED)
(GRY)

- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- ▨ : part mounted on the conductor side.
- ▲ : nonflammable resistor.
- ⊗ : Through hole.
- ░ : B + pattern
- ▒ : B − pattern

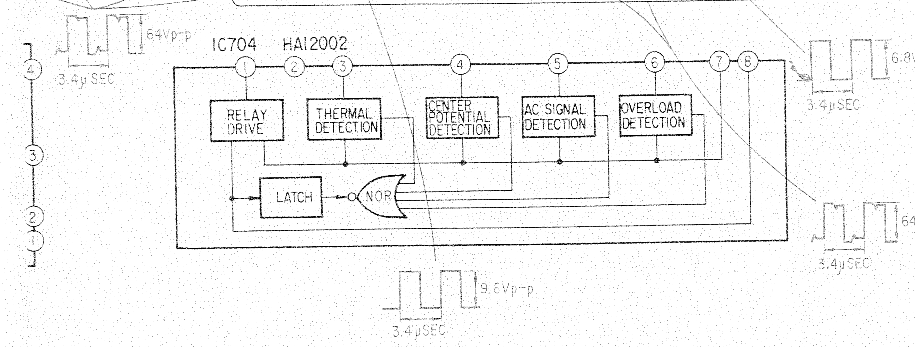
C D E F G H I J

- Refer to page 11 for semiconductor lead layouts.

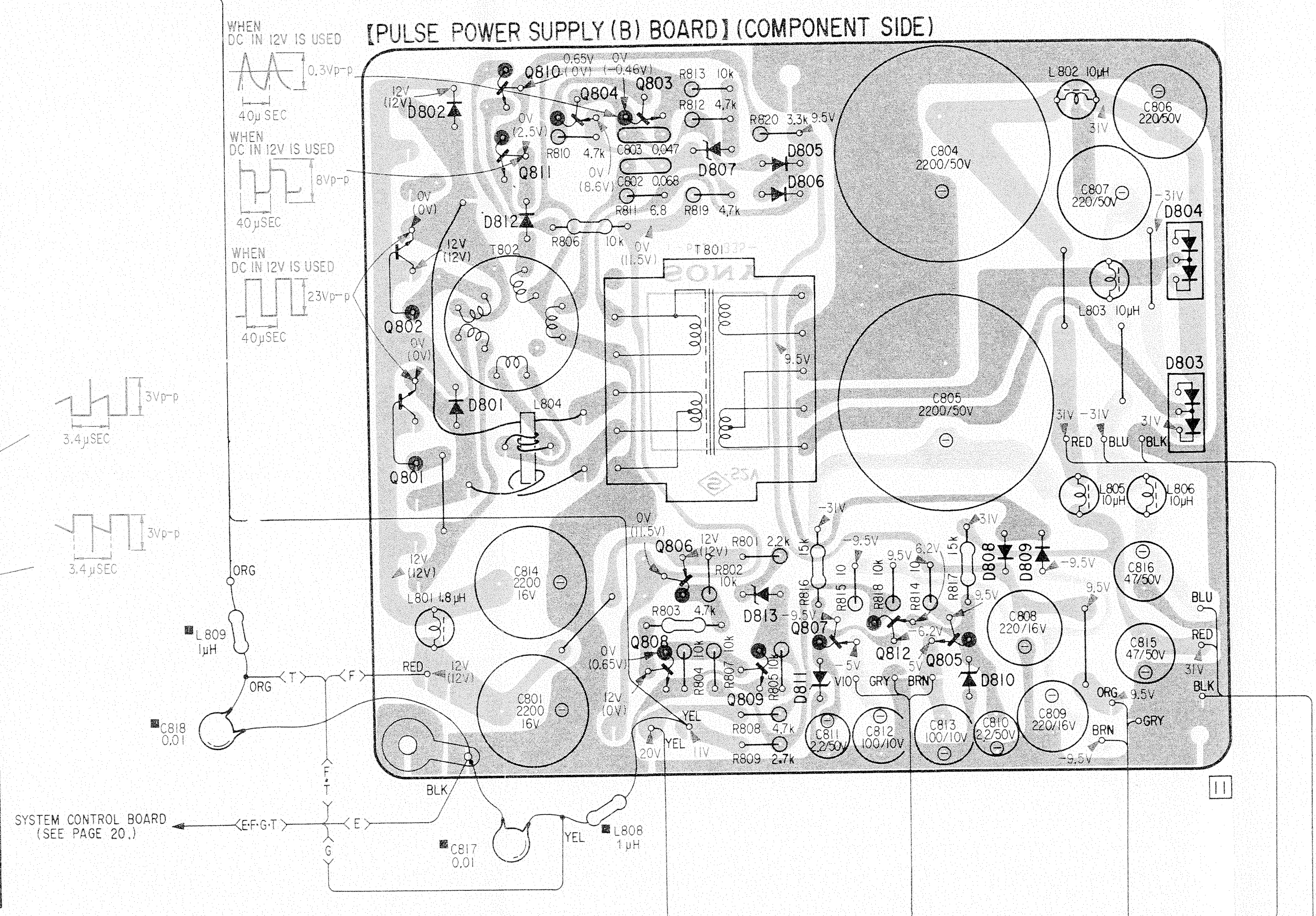
COMPONENT SIDE)


RY501
RY601
D701
IC704
IC703
IC701
IC702
Q501
Q502
Q503
Q506
Q601
Q602
Q603
Q604
Q605
Q607
Q608
Q609
Q610
Q611
Q612
Q613
Q614
Q701
Q702
D509
D515
D601
D603
D604
D607
D608
D609
D610
D612
D615
D616
C506 220/50V
C607 220/50V
C604
L601 19.5μH
L602 13.5μH
R620 0.1 (5W)
11

Q , IC	D
	701
IC704	
501 601	
514 614 IC703	
502,602 512,513 613,612 503,603	512,511 611,612
IC701	502,501,601,602
507,505,504,506 606,604,605,607	
	507,503,504 604,603,607
IC702 702,701	506,505,605,606
	516,510,509,515 615,609,610,616
	508 608
509,511,510,508 608,610,611,609	
Q , IC	D


64Vp-p
3.4μSEC
6.8Vp-p
3.4μSEC
64Vp-p
3.4μSEC
9.6Vp-p
3.4μSEC
IC704 HA12002
RELAY DRIVE
THERMAL DETECTION
CENTER POTENTIAL DETECTION
AC SIGNAL DETECTION
OVERLOAD DETECTION
LATCH
NOR

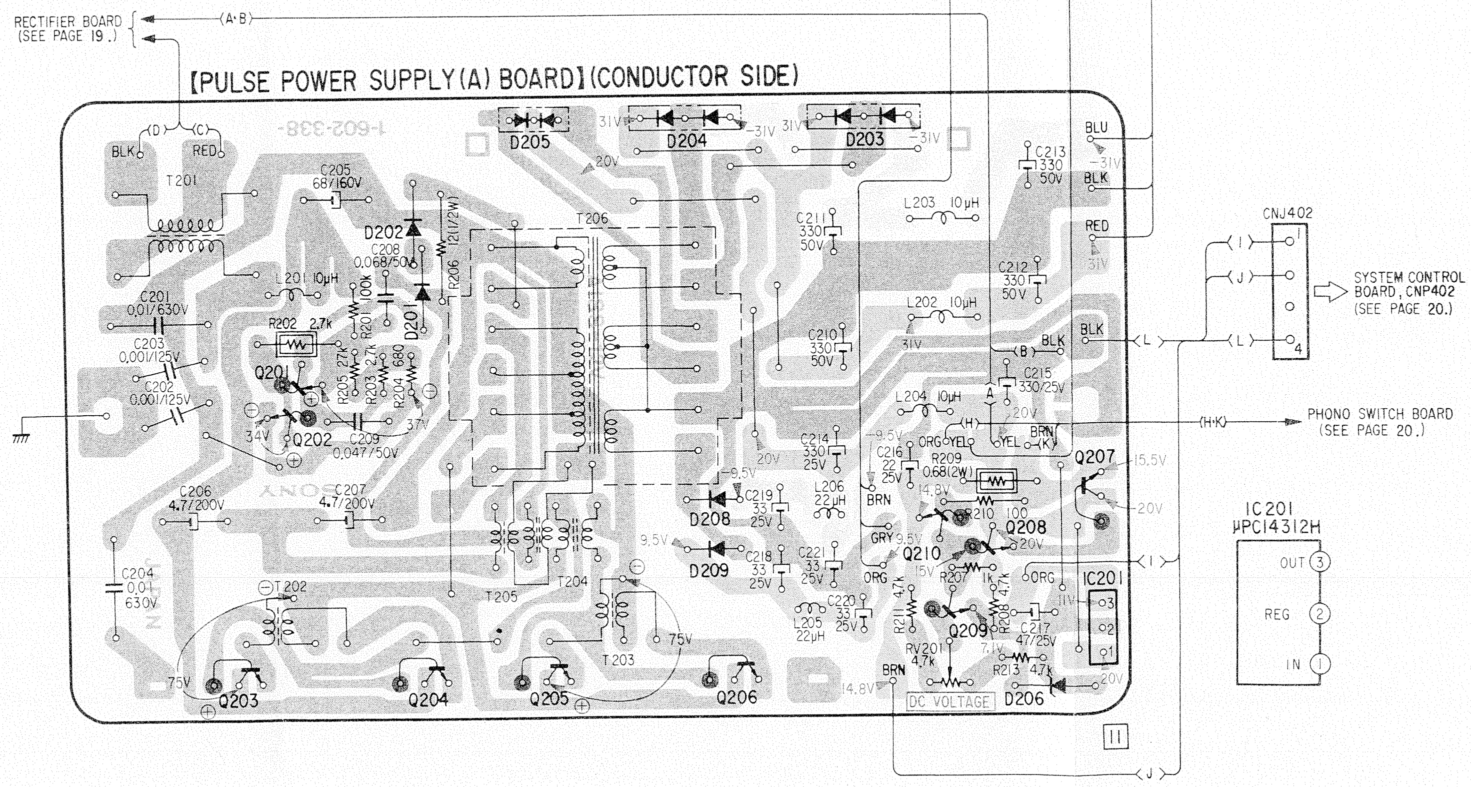
[PULSE POWER SUPPLY (B) BOARD] (COMPONENT SIDE)


WHEN DC IN 12V IS USED
0.3Vp-p
40μSEC
WHEN DC IN 12V IS USED
8Vp-p
40μSEC
WHEN DC IN 12V IS USED
23Vp-p
40μSEC
3Vp-p
3.4μSEC
3Vp-p
3.4μSEC
L809 1μH
C818 0.01
C817 0.01
L808 1μH
SYSTEM CONTROL BOARD (SEE PAGE 20.)
Q801
Q802
Q803
Q804
Q805
Q806
Q807
Q808
Q809
Q810
Q811
Q812
D801
D802
D803
D804
D805
D806
D807
D808
D809
D810
D811
D812
D813
T801
T802
L801 1.8μH
L802 10μH
L803 10μH
L804
L805 10μH
L806 10μH
C804 2200/50V
C805 2200/50V
C806 220/50V
C807 220/50V
C814 2200 16V
C801 2200 16V
C808 220/16V
C815 47/50V
C816 47/50V
11

Q	D
810 804,803	802
811	807 805
	806
	812
802	804
801	801 803
806	808,809 813
807,812,805	
808,809	811,810
Q	D

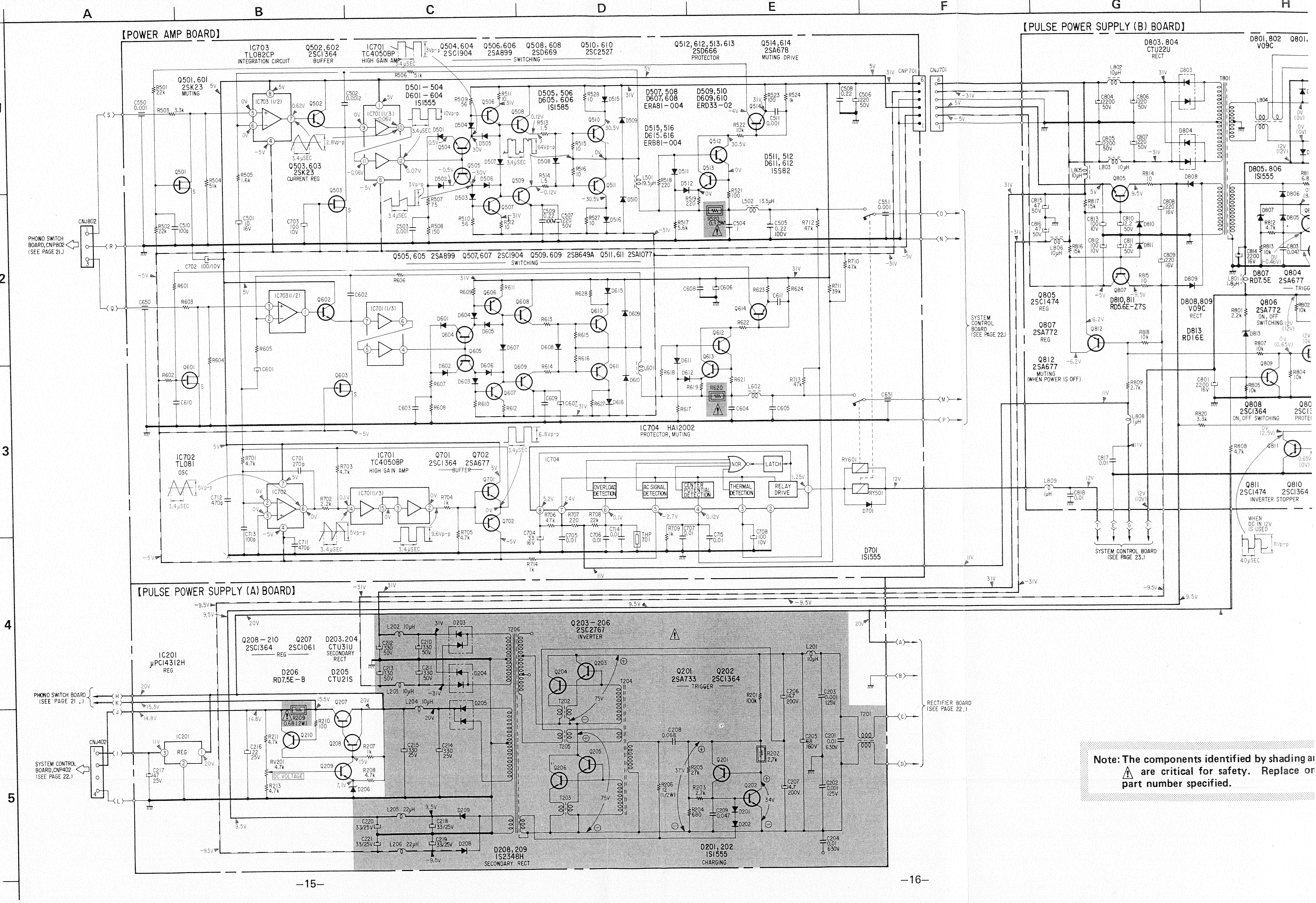
Q ,IC	D
	205,204,203
	202
	201
201	
202	
207	208
210 208	
	209
209	
IC201	
203, 204 205,206	206
Q,IC	D

[PULSE POWER SUPPLY (A) BOARD] (CONDUCTOR SIDE)

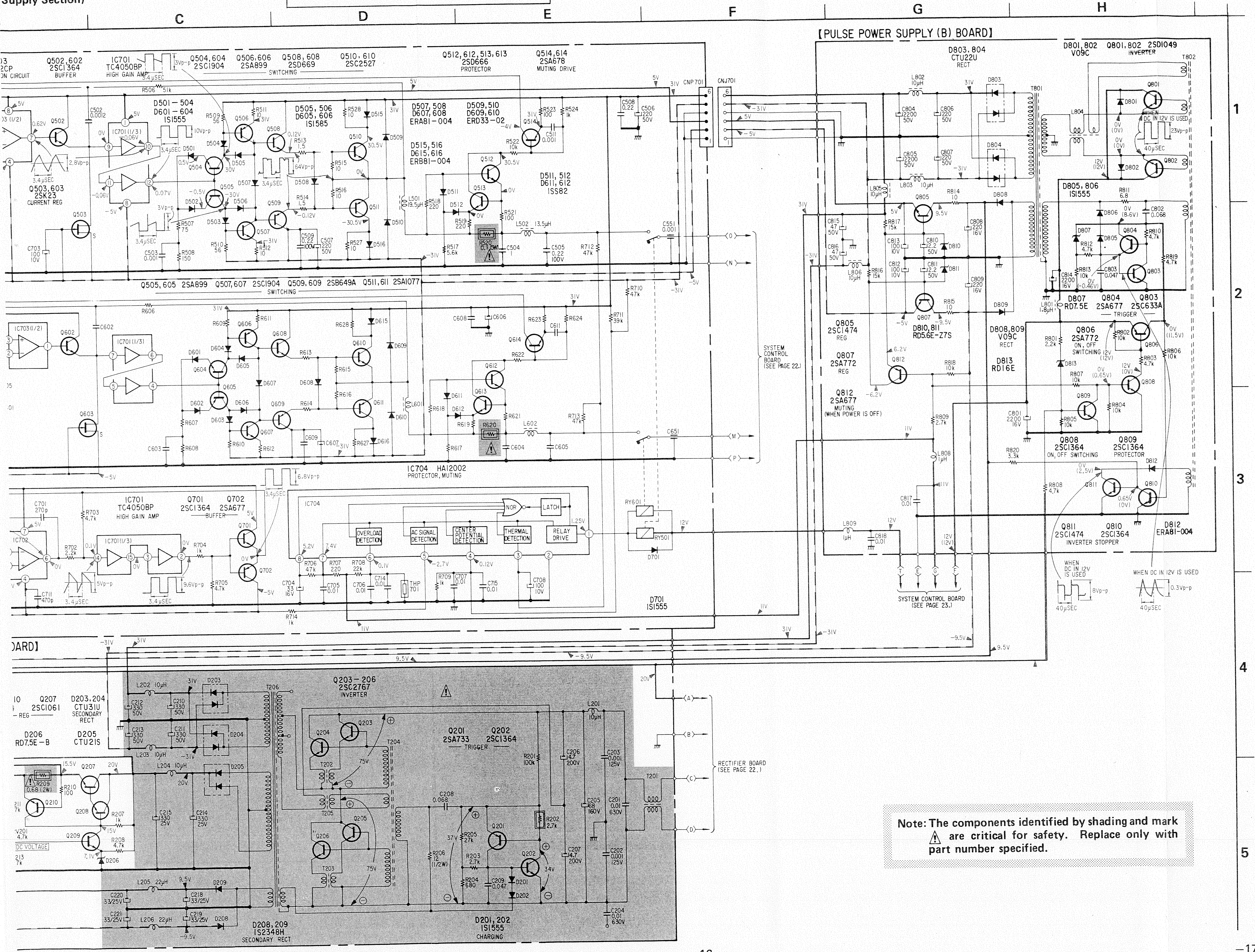

RECTIFIER BOARD (SEE PAGE 19.)
1-602-338-
T201
T202
T203
T204
T205
T206
D201
D202
D203
D204
D205
D206
D208
D209
Q201
Q202
Q203
Q204
Q205
Q206
Q207
Q208
Q209
Q210
IC201
L201 10μH
L202 10μH
L203 10μH
L204 10μH
CNJ402
SYSTEM CONTROL BOARD, CNP402 (SEE PAGE 20.)
PHONO SWITCH BOARD (SEE PAGE 20.)
IC201 μPC14312H
OUT
REG
IN
DC VOLTAGE
11

1 2 3 4 5

4-2. SCHEMATIC DIAGRAM (Power Amp/Power Supply Section)


A
B
C
D
E
F
G
H
1
2
3
4
5
【POWER AMP BOARD】
IC703 TL082CP INTEGRATION CIRCUIT
Q502, 602 2SC1364 BUFFER
IC701 TC4050BP HIGH GAIN AMP
Q504, 604 2SC1904
Q506, 606 2SA899
Q508, 608 2SD669
SWITCHING
Q510, 610 2SC2527
Q512, 612, 513, 613 2SD666 PROTECTOR
Q514, 614 2SA678 MUTING DRIVE
Q501, 601 2SK23 MUTING
Q503, 603 2SK23 CURRENT REG
D501 – 504 D601 – 604 IS1555
D505, 506 D605, 606 IS1585
D507, 508 D607, 608 ERA81-004
D509, 510 D609, 610 ERD33-02
D515, 516 D615, 616 ERB81-004
D511, 512 D611, 612 ISS82
Q505, 605 2SA899 Q507, 607 2SC1904 Q509, 609 2SB649A Q511, 611 2SA1077 SWITCHING
IC702 TL081 OSC
IC701 TC4050BP HIGH GAIN AMP
Q701 2SC1364 Q702 2SA677 BUFFER
IC704 HA12002 PROTECTOR, MUTING
OVERLOAD DETECTION
AC SIGNAL DETECTION
CENTER POTENTIAL DETECTION
THERMAL DETECTION
RELAY DRIVE
NOR
LATCH
D701 IS1555
PHONO SWITCH BOARD, CNP802 (SEE PAGE 21.)
CNJ802
SYSTEM CONTROL BOARD (SEE PAGE 22.)
【PULSE POWER SUPPLY (A) BOARD】
Q208 – 210 2SC1364 REG
Q207 2SC1061
D203, 204 CTU31U SECONDARY RECT
D206 RD7.5E-B
D205 CTU21S
IC201 μPC14312H REG
Q203 – 206 2SC2767 INVERTER
Q201 2SA733 Q202 2SC1364 TRIGGER
D208, 209 IS2348H SECONDARY RECT
D201, 202 IS1555 CHARGING
DC VOLTAGE
PHONO SWITCH BOARD (SEE PAGE 21.)
SYSTEM CONTROL BOARD, CNP402 (SEE PAGE 22.)
CNJ402
RECTIFIER BOARD (SEE PAGE 22.)
【PULSE POWER SUPPLY (B) BOARD】
D803, 804 CTU22U RECT
D801, 802 V09C
D805, 806 IS1555
Q805 2SC1474 REG
Q807 2SA772 REG
Q812 2SA677 MUTING (WHEN POWER IS OFF)
D810, 811 RD5.6E-Z7S
D808, 809 V09C RECT
D813 RD16E
D807 RD7.5E
Q804 2SA677 TRIGG
Q806 2SA772 ON, OFF SWITCHING
Q808 2SC1364 ON, OFF SWITCHING
Q811 2SC1474 Q810 2SC1364 INVERTER STOPPER
WHEN DC IN 12V IS USED
SYSTEM CONTROL BOARD (SEE PAGE 23.)
CNP701
CNJ701
RY601
RY501

Note: The components identified by shading a
⚠ are critical for safety. Replace o
part number specified.


C
D
E
F
G
H
1
2
3
4
5
[PULSE POWER SUPPLY (B) BOARD]
Q502,602 2SC1364 BUFFER
IC701 TC4050BP HIGH GAIN AMP
Q504,604 2SC1904
Q506,606 2SA899
Q508,608 2SD669
SWITCHING
Q510,610 2SC2527
Q512,612,513,613 2SD666 PROTECTOR
Q514,614 2SA678 MUTING DRIVE
D501–504 D601–604 1S1555
D505,506 D605,606 1S1585
D507,508 D607,608 ERA81-004
D509,510 D609,610 ERD33-02
D515,516 D615,616 ERB81-004
D511,512 D611,612 1SS82
Q503,603 2SK23 CURRENT REG
Q505,605 2SA899 Q507,607 2SC1904 Q509,609 2SB649A Q511,611 2SA1077
SWITCHING
SYSTEM CONTROL BOARD (SEE PAGE 22.)
IC704 HA12002 PROTECTOR, MUTING
IC701 TC4050BP HIGH GAIN AMP
Q701 2SC1364 BUFFER
Q702 2SA677
OVERLOAD DETECTION
AC SIGNAL DETECTION
CENTER POTENTIAL DETECTION
THERMAL DETECTION
RELAY DRIVE
NOR
LATCH
D701 1S1555
Q207 2SC1061 REG
D203,204 CTU31U SECONDARY RECT
D206 RD7.5E-B
D205 CTU21S
Q203–206 2SC2767 INVERTER
Q201 2SA733
Q202 2SC1364
TRIGGER
D208,209 1S2348H SECONDARY RECT
D201,202 1S1555 CHARGING
RECTIFIER BOARD (SEE PAGE 22.)
DC VOLTAGE
D803,804 CTU22U RECT
D801,802 V09C
Q801,802 2SD1049 INVERTER
D805,806 1S1555
Q805 2SC1474 REG
Q807 2SA772 REG
Q812 2SA677 MUTING (WHEN POWER IS OFF)
D810,811 RD5.6E-Z7S
D808,809 V09C RECT
D813 RD16E
D807 RD7.5E
Q804 2SA677
Q803 2SC633A
TRIGGER
Q806 2SA772 ON, OFF SWITCHING
Q808 2SC1364 ON, OFF SWITCHING
Q809 2SC1364 PROTECTOR
Q811 2SC1474 INVERTER STOPPER
Q810 2SC1364
D812 ERA81-004
SYSTEM CONTROL BOARD (SEE PAGE 23.)
WHEN DC IN 12V IS USED
WHEN DC IN 12V IS USED

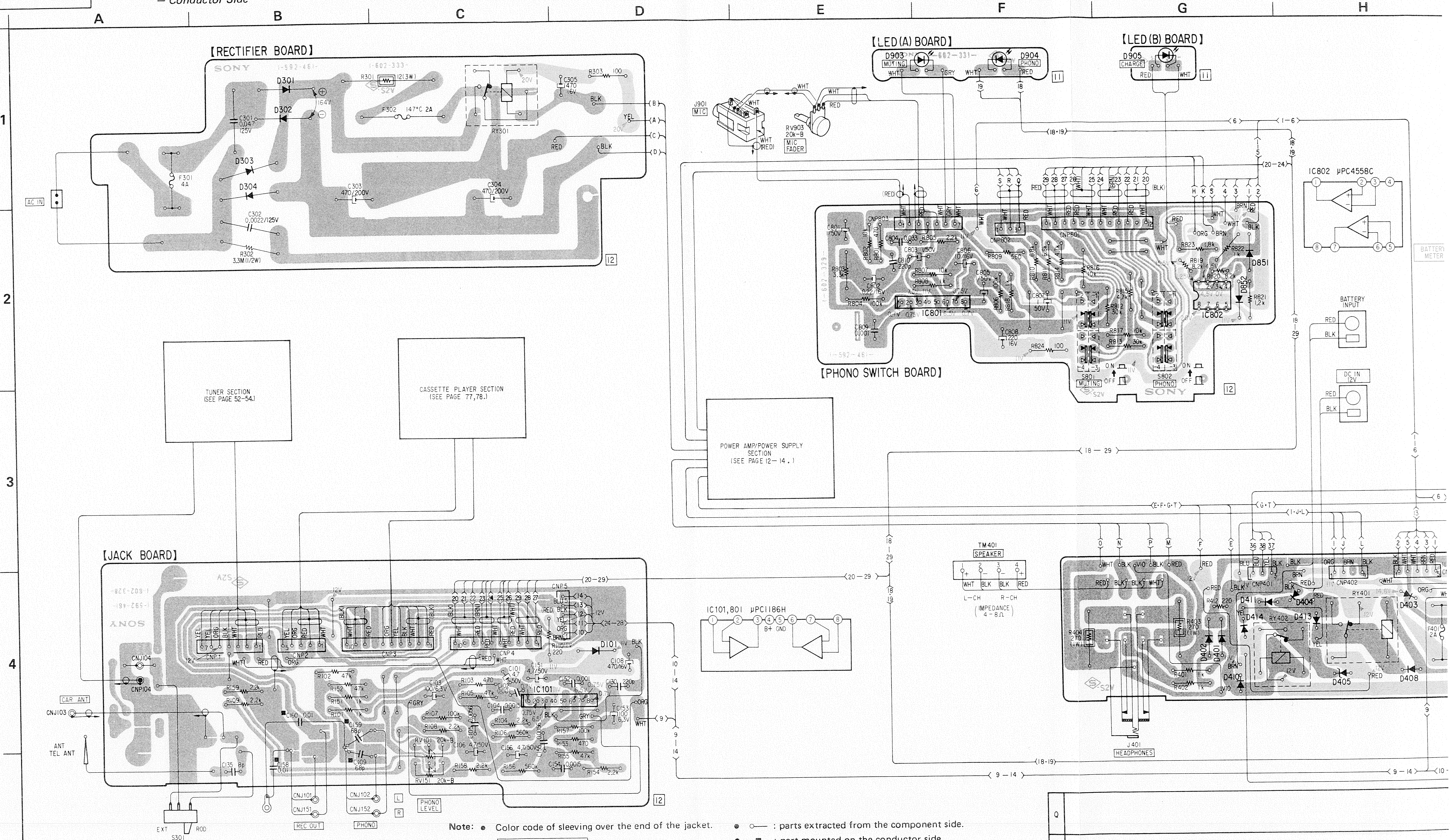
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:

- Components for right channel have same values as for left channel. Reference numbers are coded from 601.
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- ▨ : nonflammable resistor.
- ☐ : adjustment for repair.
- ——— : B+ bus.
- - - - : B− bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
  ( ) : when DC IN 12V is used.
- Voltage variations may be noted due to normal production tolerances.

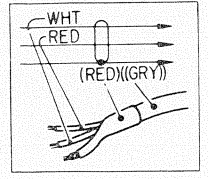
4-3. MOUNTING DIAGRAM
– Conductor Side –

- Refer to page 23 for semiconductor lead layouts.


A
B
C
D
E
F
G
H
1
2
3
4
5
[RECTIFIER BOARD]
D301
D302
D303
D304
R301 12(3W)
F302 147°C 2A
RY301
R303 100
C305 470 16V
C301 0.047 125V
F301 4A
C303 470/200V
C304 470/200V
C302 0.0022/125V
R302 3.3M(1/2W)
AC IN
[LED(A) BOARD]
D903 MUTING
D904 PHONO
[LED(B) BOARD]
D905 CHARGE
J901 MIC
RV903 20k-B MIC FADER
IC802 μPC4558C
BATTERY METER
BATTERY INPUT
DC IN 12V
[PHONO SWITCH BOARD]
IC801
IC802
D851
D852
S801 MUTING
S802 PHONO
TUNER SECTION (SEE PAGE 52–54.)
CASSETTE PLAYER SECTION (SEE PAGE 77,78.)
POWER AMP/POWER SUPPLY SECTION (SEE PAGE 12–14.)
[JACK BOARD]
CNP1
CNP2
CNP3
CNP4
CNP5
IC101
D101
CNJ104
CNP104
CAR ANT
CNJ103
ANT TEL ANT
S301 ANTENNA
EXT
ROD
CNJ101
CNJ151
REC OUT
CNJ102
CNJ152
PHONO
L
R
PHONO LEVEL
RV101 20k-B
RV151 20k-B
IC101,801 μPC1186H
B+ GND
TM401 SPEAKER
L-CH R-CH
(IMPEDANCE 4 – 8Ω)
J401 HEADPHONES
CNP401
CNP402
RY401
RY402
D401
D402
D403
D404
D405
D408
D410
D411
D413
D414
R401 1k
R402
R403 270 (1W)
R404 270 (1W)
F401 2A
SONY
12

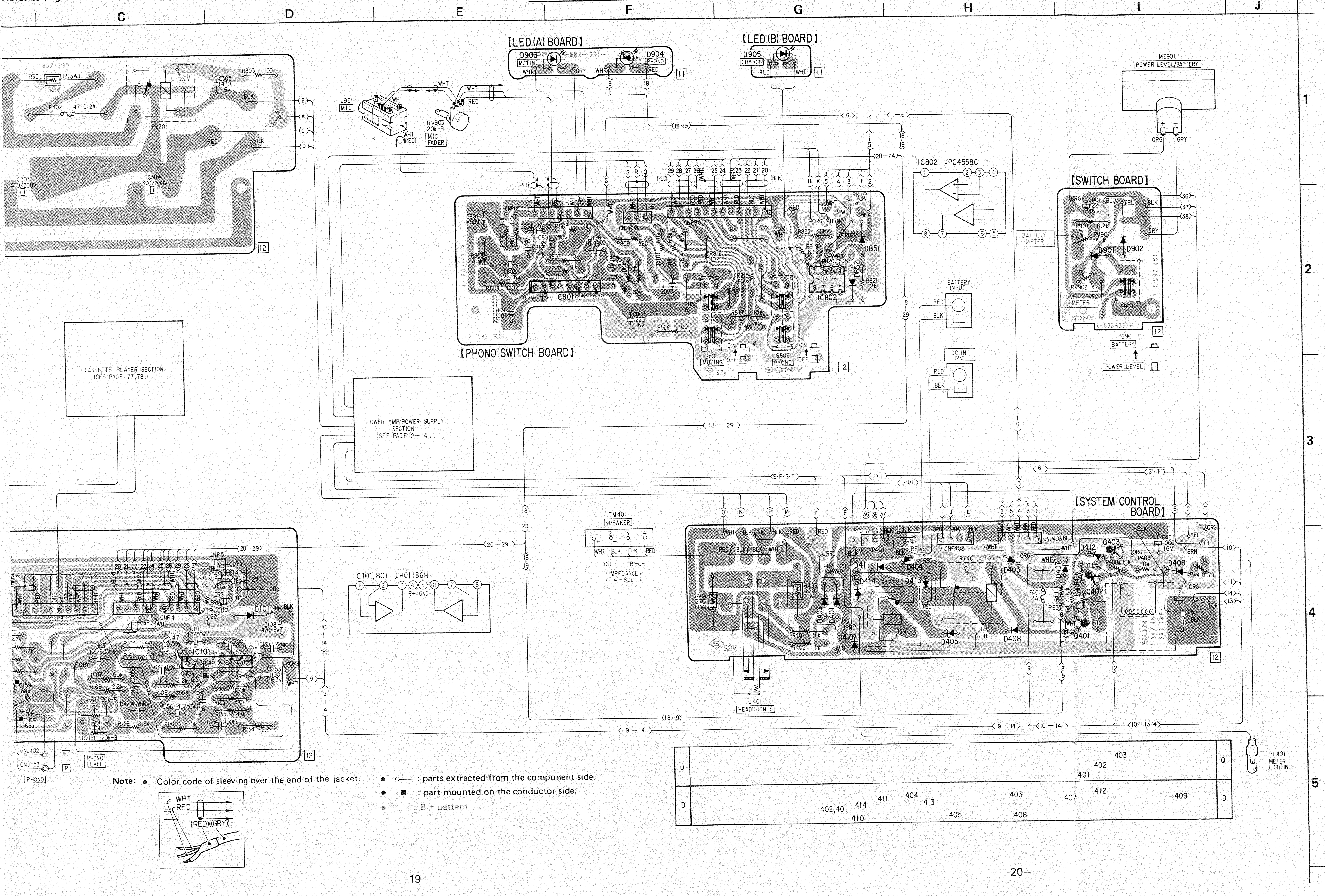
Q	
D	402,401 414 410 411 404 413 405 403 408

Note: ● Color code of sleeving over the end of the jacket.


WHT
RED
(RED)(GRY)

- ● ○— : parts extracted from the component side.
- ● ■ : part mounted on the conductor side.
- ● ▨ : B + pattern

Refer to page 23 for semiconductor lead layouts.


C
D
E
F
G
H
I
J
1
2
3
4
5
【LED (A) BOARD】
D903
MUTING
D904
PHONO
【LED (B) BOARD】
D905
CHARGE
J901
MIC
RV903
20k-B
MIC FADER
ME901
POWER LEVEL/BATTERY
RY301
F302 147°C 2A
R301 12(3W)
C303 470/200V
C304 470/200V
C305 470 16V
R303 100
IC802 μPC4558C
【SWITCH BOARD】
BATTERY METER
D901
D902
RV901 20k
RV902 5k
POWER LEVEL METER
S901
BATTERY
POWER LEVEL
BATTERY INPUT
DC IN 12V
【PHONO SWITCH BOARD】
IC801
IC802
S801
MUTING
S802
PHONO
CASSETTE PLAYER SECTION
(SEE PAGE 77,78.)
POWER AMP/POWER SUPPLY SECTION
(SEE PAGE 12-14.)
TM401
SPEAKER
L-CH
R-CH
(IMPEDANCE 4-8Ω)
IC101,801 μPC1186H
B+ GND
【SYSTEM CONTROL BOARD】
RY401
RY402
J401
HEADPHONES
PL401
METER LIGHTING
IC101
CNJ102
CNJ152
PHONO
PHONO LEVEL
RV101 20k-B
RV151 20k-B
Q 403 402 401 Q
D 402,401 414 411 404 413 410 405 403 408 407 412 409 D

Note: ● Color code of sleeving over the end of the jacket.

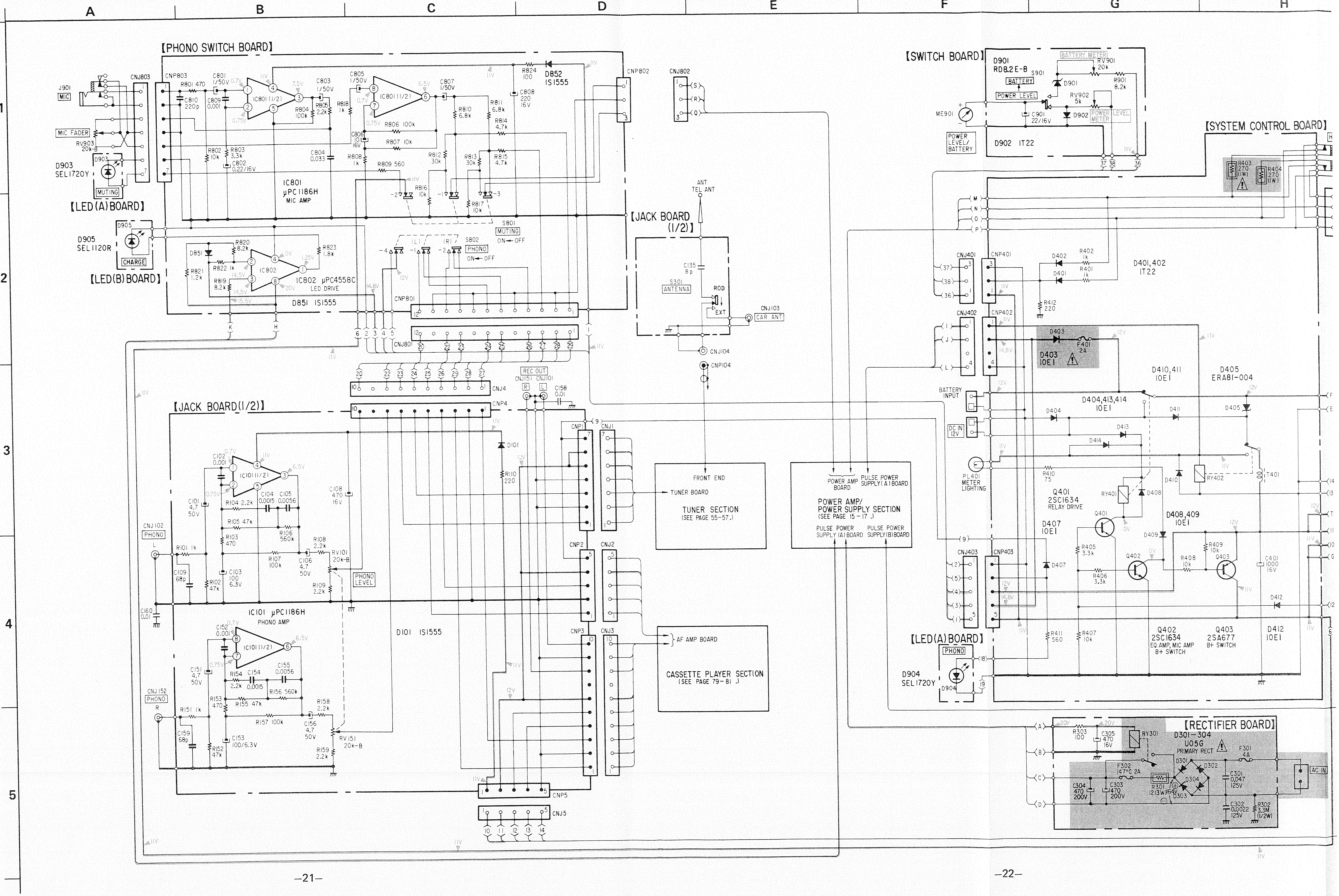
● ○— : parts extracted from the component side.

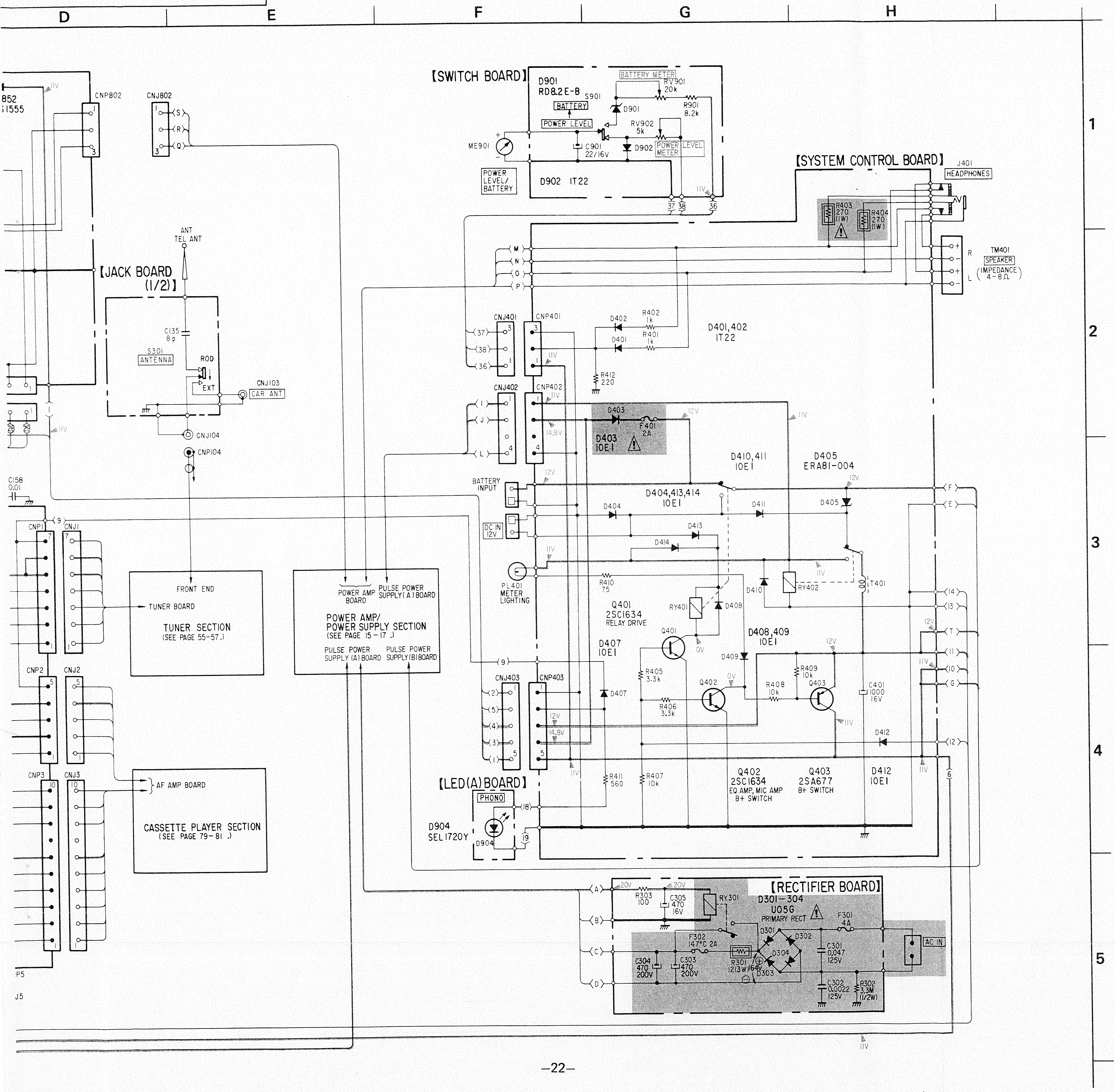
● ■ : part mounted on the conductor side.

● ░ : B + pattern

WHT
RED
(RED)(GRY)

4-4. SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
H
1
2
3
4
5
【PHONO SWITCH BOARD】
J901
MIC
CNJ803
CNP803
MIC FADER
RV903 20k-B
D903 SEL1720Y
MUTING
【LED(A)BOARD】
D905 SEL1120R
CHARGE
【LED(B)BOARD】
IC801 μPC1186H MIC AMP
IC802 μPC4558C LED DRIVE
D851 IS1555
D852 IS1555
S801 MUTING ON ← OFF
S802 PHONO ON ← OFF
CNP802
CNJ802
CNP801
CNJ801
【JACK BOARD (1/2)】
ANT TEL ANT
S301 ANTENNA
ROD
EXT
CNJ103 CAR ANT
CNJ104
CNP104
CNJ4
CNP4
REC OUT
CNJ151 CNJ101
【JACK BOARD(1/2)】
CNJ102 PHONO L
CNJ152 PHONO R
IC101 μPC1186H PHONO AMP
RV101 20k-B
PHONO LEVEL
RV151 20k-B
D101 IS1555
CNP1 CNJ1
CNP2 CNJ2
CNP3 CNJ3
CNP5 CNJ5
FRONT END
TUNER BOARD
TUNER SECTION (SEE PAGE 55-57.)
AF AMP BOARD
CASSETTE PLAYER SECTION (SEE PAGE 79-81.)
POWER AMP BOARD
PULSE POWER SUPPLY(A)BOARD
POWER AMP/ POWER SUPPLY SECTION (SEE PAGE 15-17.)
PULSE POWER SUPPLY (A) BOARD
PULSE POWER SUPPLY(B)BOARD
【SWITCH BOARD】
D901 RD8.2E-B
S901
BATTERY
POWER LEVEL
BATTERY METER
RV901 20k
R901 8.2k
RV902 5k
POWER LEVEL METER
ME901
POWER LEVEL/ BATTERY
D902 IT22
C901 22/16V
【SYSTEM CONTROL BOARD】
R403 270 (1W)
R404 270 (1W)
CNJ401
CNP401
D401,402 IT22
R412 220
CNJ402
CNP402
D403 10E1
F401 2A
D410,411 10E1
D405 ERA81-004
BATTERY INPUT
DC IN 12V
D404,413,414 10E1
PL401 METER LIGHTING
Q401 2SC1634 RELAY DRIVE
RY401
RY402
T401
D407 10E1
D408,409 10E1
CNJ403
CNP403
Q402 2SC1634 EQ AMP, MIC AMP B+ SWITCH
Q403 2SA677 B+ SWITCH
D412 10E1
C401 1000 16V
【LED(A)BOARD】
PHONO
D904 SEL1720Y
【RECTIFIER BOARD】
D301-304 U05G PRIMARY RECT
RY301
F301 4A
F302 147°C 2A
R301 12(3W)
C301 0.047 125V
C302 0.0022 125V
R302 3.3M (1/2W)
C304 470 200V
C303 470 200V
R303 100
C305 470 16V
AC IN

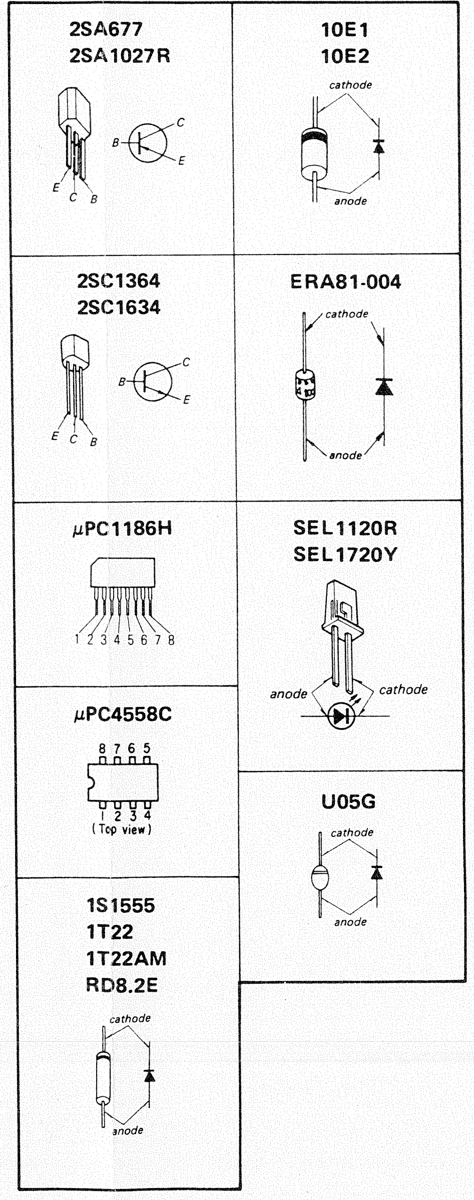

D
E
F
G
H
1
2
3
4
5
[SWITCH BOARD]
D901 RD8.2E-B
S901
BATTERY
POWER LEVEL
BATTERY METER
RV901 20k
R901 8.2k
D901
RV902 5k
C901 22/16V
D902
POWER METER
LEVEL
ME901
POWER LEVEL/ BATTERY
D902 1T22
37 38 36
[SYSTEM CONTROL BOARD]
J401 HEADPHONES
R403 270 (1W)
R404 270 (1W)
TM401 SPEAKER (IMPEDANCE 4-8Ω)
R
L
M
N
O
P
CNP802
CNJ802
S
R
Q
852
1555
[JACK BOARD (1/2)]
ANT TEL ANT
C135 8p
S301 ANTENNA
ROD
EXT
CNJ103 CAR ANT
CNJ104
CNP104
C158 0.01
CNJ401
CNP401
D402
R402 1k
R401 1k
D401
D401,402 1T22
R412 220
CNJ402
CNP402
D403
F401 2A
D403 10E1
14.8V
12V
11V
D410,411 10E1
D405 ERA81-004
BATTERY INPUT
DC IN 12V
D404,413,414 10E1
D404
D411
D405
D413
D414
PL401 METER LIGHTING
R410 75
Q401 2SC1634 RELAY DRIVE
RY401
D408
D410
RY402
T401
Q401
D407 10E1
D407
D408,409 10E1
D409
R405 3.3k
Q402
R406 3.3k
R408 10k
R409 10k
Q403
C401 1000 16V
D412
CNJ403
CNP403
R411 560
R407 10k
Q402 2SC1634 EQ AMP, MIC AMP B+ SWITCH
Q403 2SA677 B+ SWITCH
D412 10E1
[LED(A) BOARD]
PHONO
D904 SEL1720Y
D904
18
19
CNP1
CNJ1
FRONT END
TUNER BOARD
TUNER SECTION (SEE PAGE 55-57.)
POWER AMP BOARD
PULSE POWER SUPPLY (A) BOARD
POWER AMP/ POWER SUPPLY SECTION (SEE PAGE 15-17.)
PULSE POWER SUPPLY (A) BOARD
PULSE POWER SUPPLY (B) BOARD
CNP2
CNJ2
CNP3
CNJ3
AF AMP BOARD
CASSETTE PLAYER SECTION (SEE PAGE 79-81.)
P5
J5
[RECTIFIER BOARD]
20V
R303 100
C305 470 16V
RY301
D301-304 U05G PRIMARY RECT
F301 4A
F302 147°C 2A
D301
D302
D304
D303
C301 0.047 125V
C304 470 200V
C303 470 200V
R301 12(3W)
C302 0.0022 125V
R302 3.3M (1/2W)
AC IN
A
B
C
D

Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- ▭ : nonflammable resistor.
- ▭ : adjustment for repair.
- ——— : B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
- Voltage variations may be noted due to normal production tolerances.

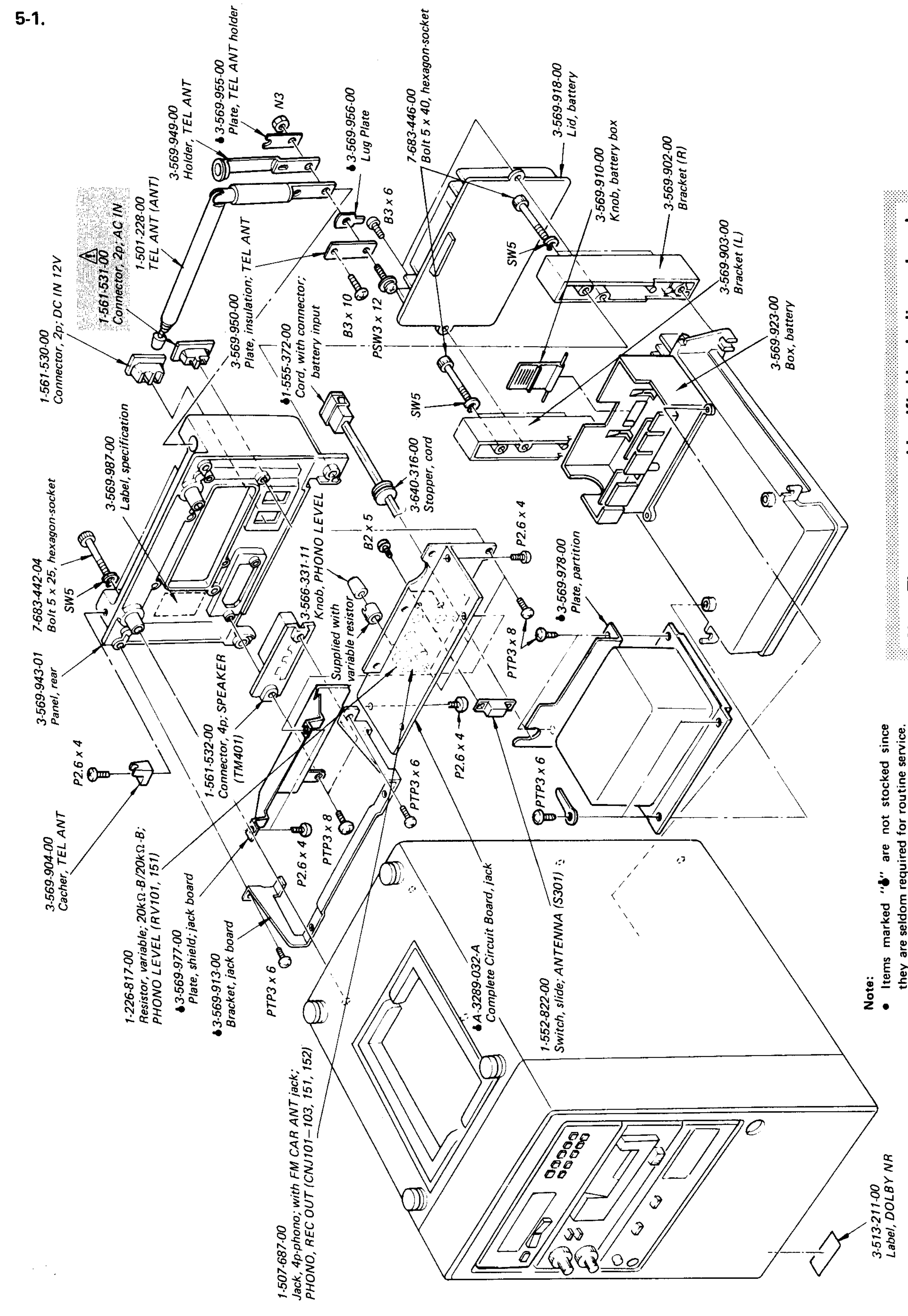
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Semiconductor Lead Layouts


2SA677
2SA1027R
E C B
B C E
10E1
10E2
cathode
anode
2SC1364
2SC1634
E C B
B C E
ERA81-004
cathode
anode
μPC1186H
1 2 3 4 5 6 7 8
SEL1120R
SEL1720Y
anode
cathode
μPC4558C
8 7 6 5
1 2 3 4
(Top view)
U05G
cathode
anode
1S1555
1T22
1T22AM
RD8.2E
cathode
anode

SECTION 5
EXPLODED VIEWS

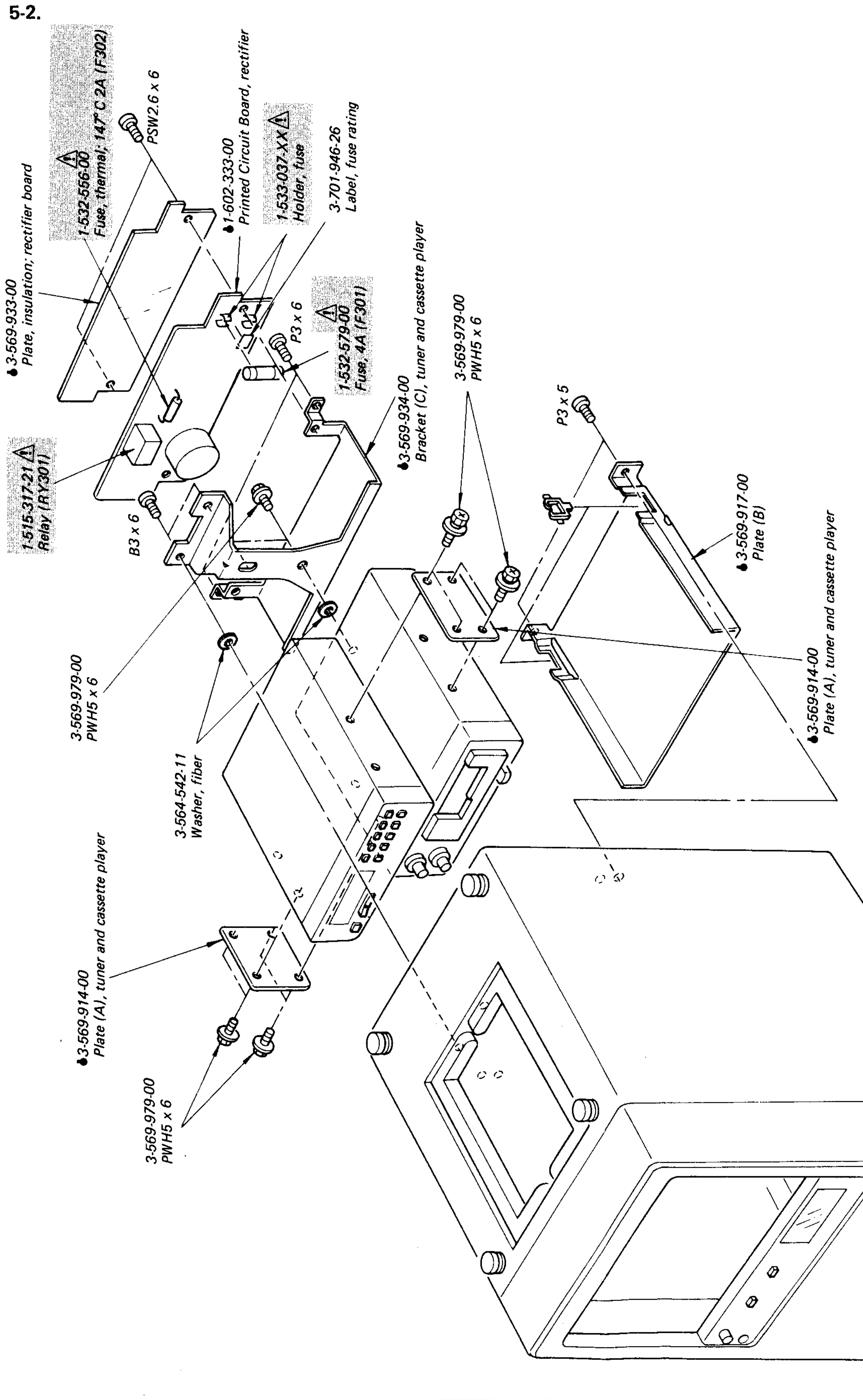
5-1.


E
D
C
B
A
1
2
3
4
3-569-949-00 Holder, TEL ANT
♠3-569-955-00 Plate, TEL ANT holder
N3
♠3-569-956-00 Lug Plate
B3 x 6
1-501-228-00 TEL ANT (ANT)
⚠ 1-561-531-00 Connector, 2p; AC IN
1-561-530-00 Connector, 2p; DC IN 12V
♠3-569-950-00 Plate, insulation; TEL ANT
B3 x 10
PSW3 x 12
♠1-555-372-00 Cord, with connector; battery input
7-683-446-00 Bolt 5 x 40, hexagon-socket
3-569-918-00 Lid, battery
3-569-910-00 Knob, battery box
3-569-902-00 Bracket (R)
3-569-903-00 Bracket (L)
3-569-923-00 Box, battery
SW5
SW5
3-569-987-00 Label, specification
7-683-442-04 Bolt 5 x 25, hexagon-socket
SW5
3-569-943-01 Panel, rear
3-566-331-11 Knob, PHONO LEVEL
Supplied with variable resistor
3-640-316-00 Stopper, cord
B2 x 5
P2.6 x 4
♠3-569-978-00 Plate, partition
PTP3 x 8
P2.6 x 4
PTP3 x 6
1-561-532-00 Connector, 4p; SPEAKER (TM401)
P2.6 x 4
3-569-904-00 Cacher, TEL ANT
P2.6 x 4
PTP3 x 8
PTP3 x 6
1-226-817-00 Resistor, variable; 20kΩ-B/20kΩ-B; PHONO LEVEL (RV101, 151)
♠3-569-977-00 Plate, shield; jack board
♠3-569-913-00 Bracket, jack board
PTP3 x 6
♠A-3289-032-A Complete Circuit Board, jack
1-552-822-00 Switch, slide; ANTENNA (S301)
1-507-687-00 Jack, 4p-phono; with FM CAR ANT jack; PHONO, REC OUT (CNJ101-103, 151, 152)
3-513-211-00 Label, DOLBY NR

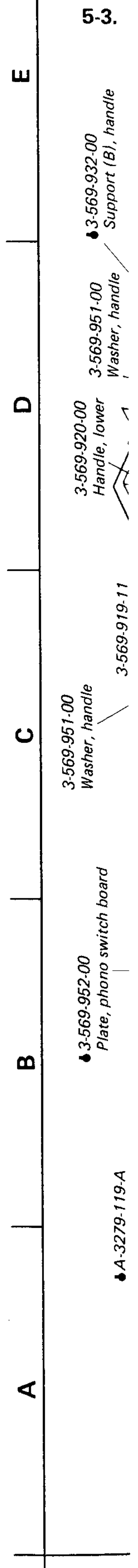
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:
- Items marked "♠" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All screws are Phillips (cross recess) type unless otherwise noted. (-) = slotted head

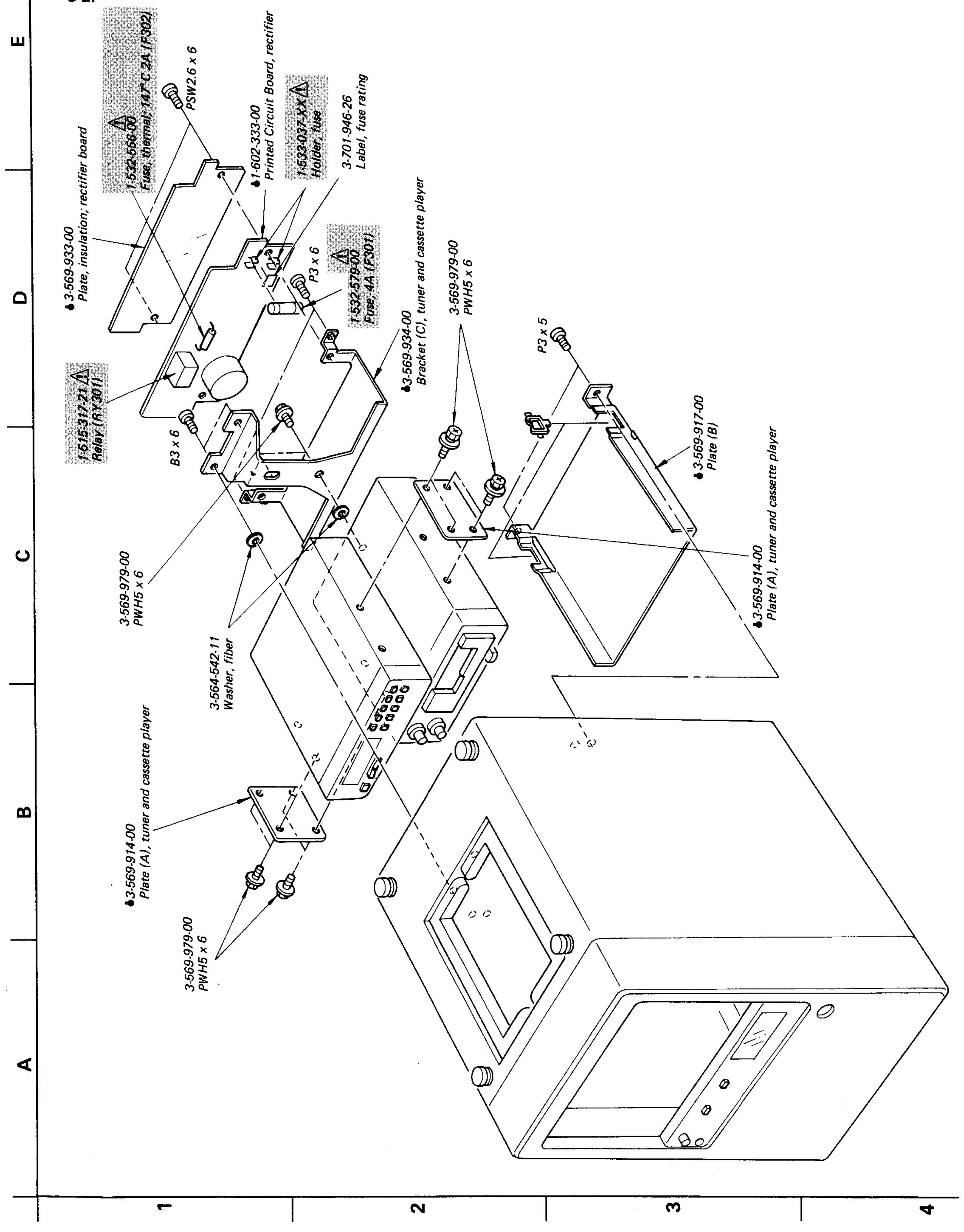
5-2.


E
D
C
B
A
1
2
3
4
⚠ 1-532-556-00 Fuse, thermal; 147° C 2A (F302)
PSW2.6 x 6
♠1-602-333-00 Printed Circuit Board, rectifier
1-533-037-XX ⚠ Holder, fuse
3-701-946-26 Label, fuse rating
♠3-569-933-00 Plate, insulation; rectifier board
⚠ 1-532-579-00 Fuse, 4A (F301)
P3 x 6
♠3-569-934-00 Bracket (C), tuner and cassette player
3-569-979-00 PWH5 x 6
1-515-317-21 ⚠ Relay (RY301)
B3 x 6
P3 x 5
♠3-569-917-00 Plate (B)
3-569-979-00 PWH5 x 6
3-564-542-11 Washer, fiber
♠3-569-914-00 Plate (A), tuner and cassette player
♠3-569-914-00 Plate (A), tuner and cassette player
3-569-979-00 PWH5 x 6

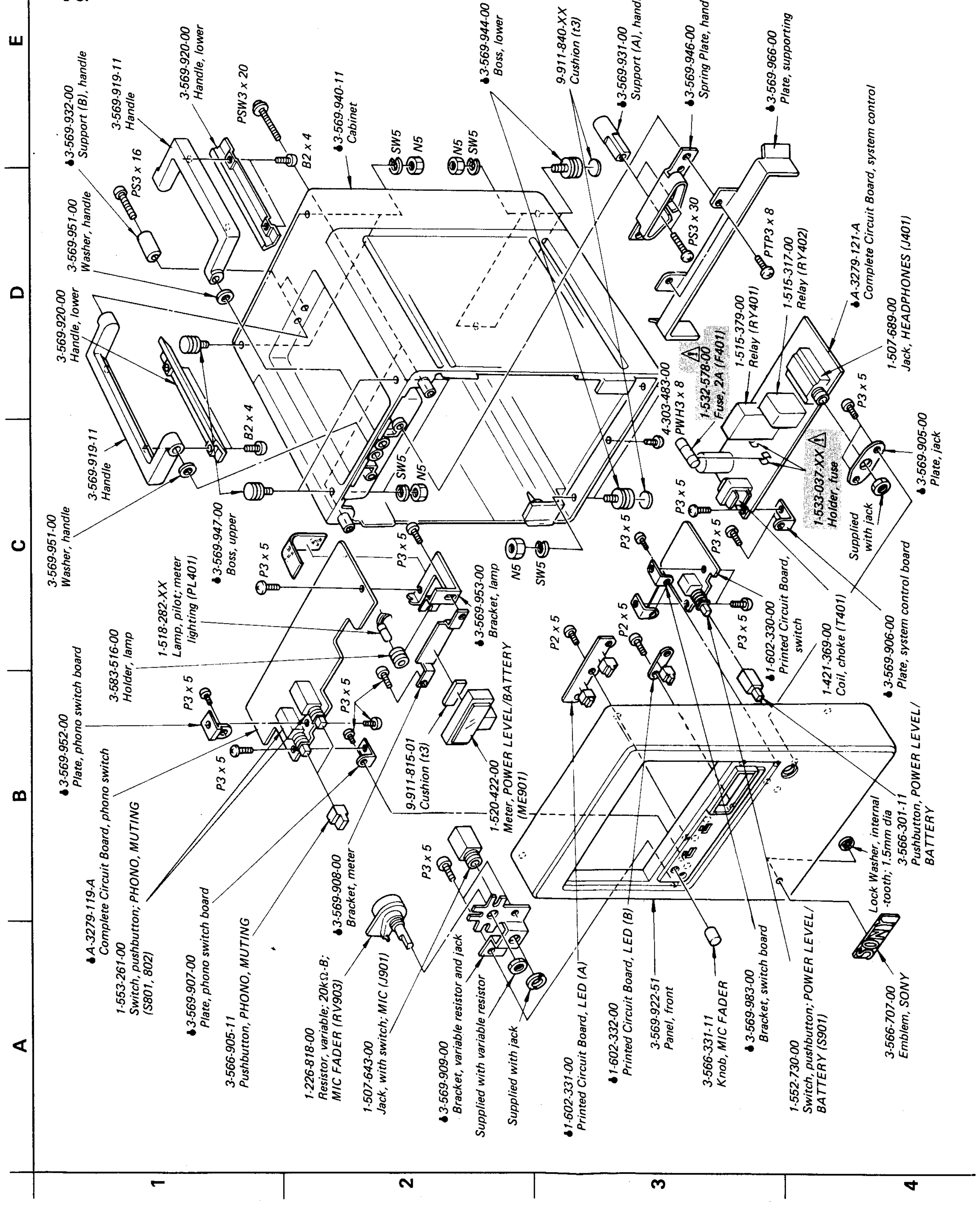
5-3.


E
D
C
B
A
♠3-569-932-00 Support (B), handle
3-569-951-00 Washer, handle
3-569-920-00 Handle, lower
3-569-919-11
3-569-951-00 Washer, handle
♠3-569-952-00 Plate, phono switch board
♠A-3279-119-A

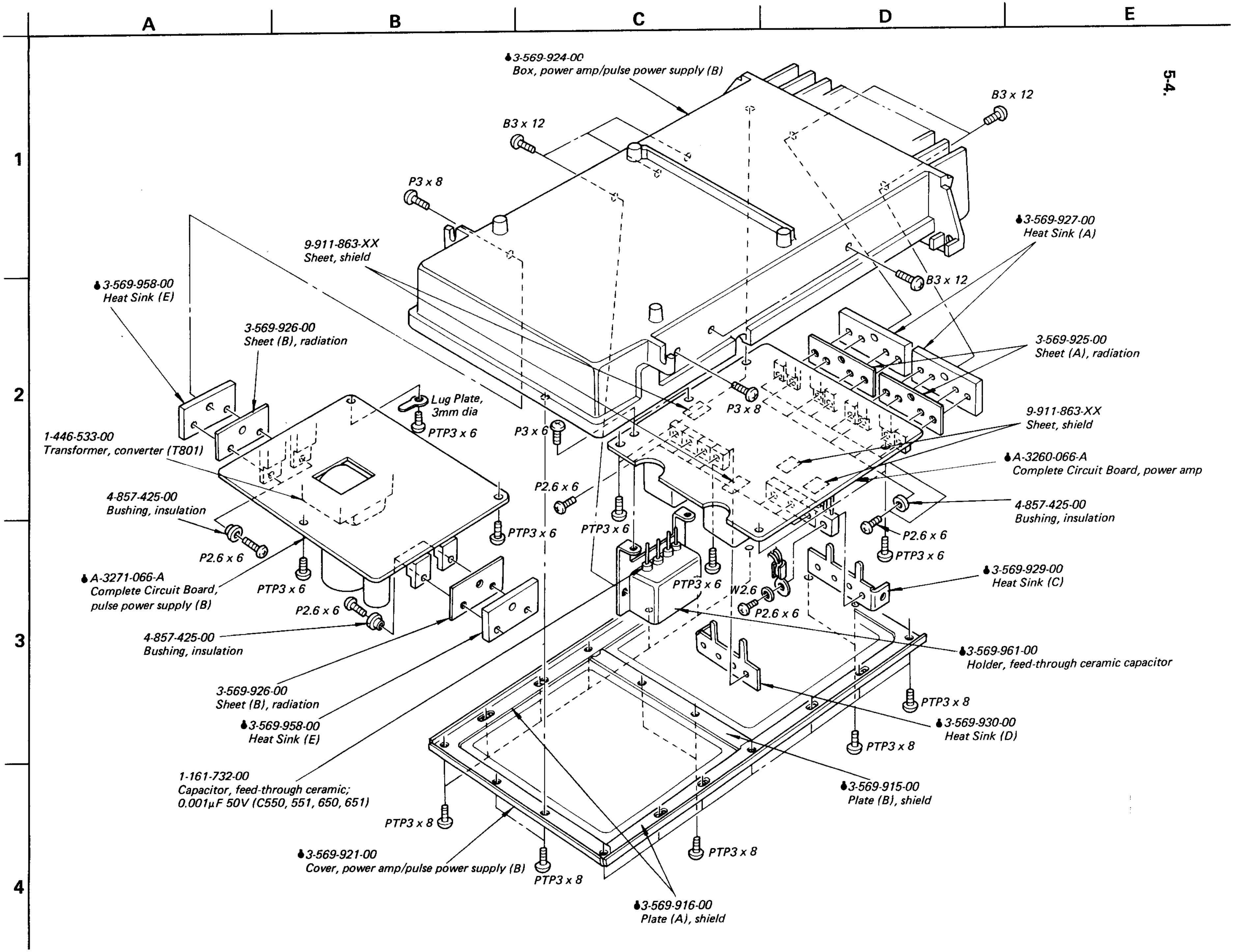
5-2.


E
D
C
B
A
1
2
3
4
3-569-933-00
Plate, insulation; rectifier board
1-532-556-00 ⚠
Fuse, thermal; 147°C 2A (F302)
PSW2.6 x 6
1-602-333-00
Printed Circuit Board, rectifier
1-533-037-XX ⚠
Holder, fuse
3-701-946-26
Label, fuse rating
P3 x 6
1-532-579-00 ⚠
Fuse, 4A (F301)
3-569-934-00
Bracket (C), tuner and cassette player
3-569-979-00
PWH5 x 6
1-515-317-21 ⚠
Relay (RY301)
B3 x 6
P3 x 5
3-569-917-00
Plate (B)
3-569-979-00
PWH5 x 6
3-564-542-11
Washer, fiber
3-569-914-00
Plate (A), tuner and cassette player
3-569-914-00
Plate (A), tuner and cassette player
3-569-979-00
PWH5 x 6

5-3.


E
D
C
B
A
1
2
3
4
3-569-932-00
Support (B), handle
3-569-919-11
Handle
3-569-920-00
Handle, lower
PSW3 x 20
B2 x 4
3-569-940-11
Cabinet
SW5
N5
N5
SW5
3-569-944-00
Boss, lower
9-911-840-XX
Cushion (t3)
3-569-931-00
Support (A), handle
3-569-946-00
Spring Plate, handle
3-569-966-00
Plate, supporting
PS3 x 16
3-569-951-00
Washer, handle
PS3 x 30
PTP3 x 8
A-3279-121-A
Complete Circuit Board, system control
1-515-317-00
Relay (RY402)
1-515-379-00
Relay (RY401)
1-532-578-00 ⚠
Fuse, 2A (F401)
1-507-689-00
Jack, HEADPHONES (J401)
3-569-920-00
Handle, lower
B2 x 4
4-303-483-00
PWH3 x 8
P3 x 5
3-569-905-00
Plate, jack
3-569-919-11
Handle
SW5
N5
1-533-037-XX ⚠
Holder, fuse
Supplied with jack
3-569-951-00
Washer, handle
3-569-947-00
Boss, upper
P3 x 5
P3 x 5
P3 x 5
P3 x 5
P3 x 5
1-518-282-XX
Lamp, pilot; meter lighting (PL401)
3-569-953-00
Bracket, lamp
N5
SW5
3-583-516-00
Holder, lamp
P2 x 5
P2 x 5
P3 x 5
1-602-330-00
Printed Circuit Board, switch
1-421-369-00
Coil, choke (T401)
3-569-906-00
Plate, system control board
P3 x 5
P3 x 5
3-569-952-00
Plate, phono switch board
P3 x 5
9-911-815-01
Cushion (t3)
1-520-422-00
Meter, POWER LEVEL/BATTERY (ME901)
Lock Washer, internal -tooth; 1.5mm dia
3-566-301-11
Pushbutton, POWER LEVEL/ BATTERY
A-3279-119-A
Complete Circuit Board, phono switch
1-553-261-00
Switch, pushbutton; PHONO, MUTING (S801, 802)
3-569-907-00
Plate, phono switch board
3-566-905-11
Pushbutton, PHONO, MUTING
3-569-908-00
Bracket, meter
P3 x 5
1-226-818-00
Resistor, variable; 20kΩ-B; MIC FADER (RV903)
1-507-643-00
Jack, with switch; MIC (J901)
3-569-909-00
Bracket, variable resistor and jack
Supplied with variable resistor
Supplied with jack
1-602-331-00
Printed Circuit Board, LED (A)
1-602-332-00
Printed Circuit Board, LED (B)
3-569-922-51
Panel, front
3-566-331-11
Knob, MIC FADER
3-569-983-00
Bracket, switch board
1-552-730-00
Switch, pushbutton; POWER LEVEL/ BATTERY (S901)
3-566-707-00
Emblem, SONY

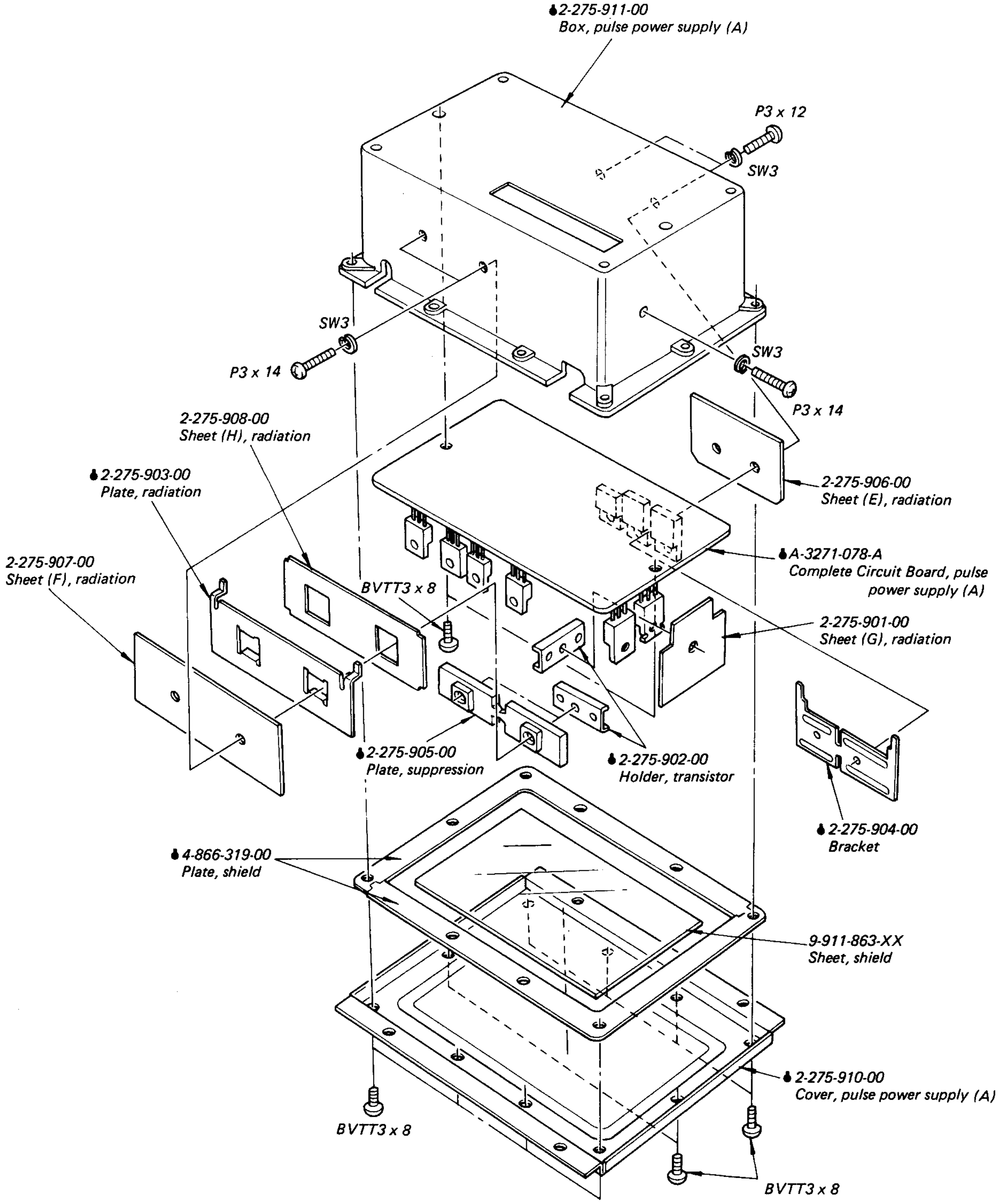
5-4.


A
B
C
D
E
1
2
3
4
▲3-569-924-00
Box, power amp/pulse power supply (B)
B3 x 12
B3 x 12
P3 x 8
9-911-863-XX
Sheet, shield
▲3-569-927-00
Heat Sink (A)
B3 x 12
▲3-569-958-00
Heat Sink (E)
3-569-926-00
Sheet (B), radiation
3-569-925-00
Sheet (A), radiation
Lug Plate,
3mm dia
PTP3 x 6
P3 x 8
P3 x 6
9-911-863-XX
Sheet, shield
1-446-533-00
Transformer, converter (T801)
▲A-3260-066-A
Complete Circuit Board, power amp
P2.6 x 6
4-857-425-00
Bushing, insulation
4-857-425-00
Bushing, insulation
P2.6 x 6
PTP3 x 6
PTP3 x 6
P2.6 x 6
PTP3 x 6
P2.6 x 6
▲3-569-929-00
Heat Sink (C)
▲A-3271-066-A
Complete Circuit Board,
pulse power supply (B)
PTP3 x 6
PTP3 x 6
W2.6
P2.6 x 6
P2.6 x 6
4-857-425-00
Bushing, insulation
▲3-569-961-00
Holder, feed-through ceramic capacitor
3-569-926-00
Sheet (B), radiation
▲3-569-958-00
Heat Sink (E)
PTP3 x 8
▲3-569-930-00
Heat Sink (D)
PTP3 x 8
1-161-732-00
Capacitor, feed-through ceramic;
0.001µF 50V (C550, 551, 650, 651)
▲3-569-915-00
Plate (B), shield
PTP3 x 8
PTP3 x 8
▲3-569-921-00
Cover, power amp/pulse power supply (B)
PTP3 x 8
▲3-569-916-00
Plate (A), shield

A B C D

1 2 3 4 5

5-5.


♦2-275-911-00
Box, pulse power supply (A)
P3 x 12
SW3
SW3
P3 x 14
SW3
P3 x 14
2-275-908-00
Sheet (H), radiation
♦2-275-903-00
Plate, radiation
2-275-906-00
Sheet (E), radiation
2-275-907-00
Sheet (F), radiation
♦A-3271-078-A
Complete Circuit Board, pulse power supply (A)
BVTT3 x 8
2-275-901-00
Sheet (G), radiation
♦2-275-905-00
Plate, suppression
♦2-275-902-00
Holder, transistor
♦2-275-904-00
Bracket
♦4-866-319-00
Plate, shield
9-911-863-XX
Sheet, shield
♦2-275-910-00
Cover, pulse power supply (A)
BVTT3 x 8
BVTT3 x 8

SECTION 6
ELECTRICAL PARTS LIST

SEMICONDUCTORS

Transistors

Ref. No.	*Part No.*	*Description*
Q201	⚠8-729-612-77	2SA1027R
Q202	⚠8-729-663-47	2SC1364
Q203–206	⚠8-729-308-62	2SC1986C
Q207	8-729-316-12	2SC1061
Q208–210 Q401, 402	8-729-663-47	2SC1364
Q403	8-729-612-77	2SA1027R
Q501, 601	8-729-105-40	2SK105A
Q502, 602	8-729-663-47	2SC1364
Q503, 603	8-729-105-40	2SK105A
Q504, 604	8-729-366-81	2SD668
Q505, 605 Q506, 606	8-729-364-81	2SB648
Q507, 607	8-729-366-81	2SD668
Q508, 608	8-729-306-92	2SD669A
Q509, 609	8-729-304-92	2SB649A
Q510, 610	8-729-952-71	2SC2527
Q511, 611	8-729-907-71	2SA1077
Q512, 612 Q513, 613	8-729-300-62	2SD666A
Q514, 614	8-729-612-77	2SA1027R
Q701	8-729-663-47	2SC1364
Q702	8-729-612-77	2SA1027R
Q801, 802	8-729-910-49	2SD1049
Q803	8-729-663-47	2SC1364
Q804	8-729-612-77	2SA1027R
Q805	8-729-177-32	2SD773
Q806, 807	8-760-523-10	2SA772-23
Q808–810	8-729-663-47	2SC1364
Q811	8-729-177-32	2SD773
Q812	8-729-612-77	2SA1027R

ICs

Ref. No.	*Part No.*	*Description*
IC101	8-759-111-86	μPC1186H
IC201	8-759-143-12	μPC14312H
IC701	8-759-140-50	μPD4050C
IC702	8-759-981-00	TL081CP
IC703	8-759-990-82	TL082CP
IC704	8-759-320-02	HA12002
IC801	8-759-111-86	μPC1186H
IC802	8-759-145-58	μPC4558C

Diodes

Ref. No.	*Part No.*	*Description*
D101	8-719-815-55	1S1555
D201, 202	⚠8-719-815-55	1S1555
D203, 204	⚠8-719-301-31	CTU31U
D205	⚠8-719-300-24	CTU21S
D206	8-719-175-07	RD7.5E
D208, 209	⚠8-719-923-48	1S2348H
D301–304	⚠8-719-911-55	U05G
D401, 402	8-719-422-21	1T22AM
D403	⚠8-719-200-02	10E2
D404	8-719-200-02	10E2
D405	8-719-981-01	ERA81-004
D407–414	8-719-200-02	10E2
D501–504 D601–604	8-719-815-55	1S1555
D505, 605 D506, 606	8-719-815-85	1S1585
D507, 607 D508, 608	8-719-981-01	ERA81-004
D509, 609 D510, 610	8-719-933-02	ERD33-02
D511, 611 D512, 612	8-719-900-93	V09C
D515, 615 D516, 616	8-719-982-04	ERB81-004
D701	8-719-815-55	1S1555
D801, 802	8-719-900-93	V09C
D803, 804	8-719-300-22	CTU22U
D805, 806	8-719-815-55	1S1555
D807	8-719-175-07	RD7.5E
D808, 809	8-719-900-93	V09C
D810, 811	8-719-156-23	RD5.6E-Z7S
D812	8-719-981-01	ERA81-004
D813	8-719-116-07	RD16E-B
D851, 852	8-719-815-55	1S1555
D901	8-719-182-07	RD8.2E
D902	8-719-422-21	1T22AM
D903, 904	8-719-317-20	SEL1720Y
D905	8-719-311-20	SEL1120R

Thermistor

Ref. No.	*Part No.*	*Description*
THP701	1-800-965-00	Positive

CAPACITORS

All capacitors are in μF. Common capacitors are omitted.
Refer to the lists on pages 88 and 89 for their part numbers.
p : μμF, elect : electrolytic

Ref. No.	*Part No.*	*Description*		
C135	1-102-865-00	8p	50V	ceramic
C201	⚠1-130-141-00	0.01	630V	film
C202, 203	⚠1-161-746-00	0.001	125V	ceramic
C204	⚠1-130-141-00	0.01	630V	film
C205	⚠1-123-277-00	68	160V	elect
C206, 207	⚠1-123-539-00	4.7	200V	solid aluminum
C208	⚠1-108-599-00	0.068	50V	mylar
C209	⚠1-108-595-00	0.047	50V	mylar
C210–213	⚠1-123-515-00	330	50V	solid aluminum
C214, 215	⚠1-123-496-00	330	25V	solid aluminum
C218–221	⚠1-123-492-00	33	25V	solid aluminum
C301	⚠1-130-197-00	0.047	125V	film
C302	⚠1-161-747-00	0.0022	125V	ceramic
C303, 304	⚠1-123-666-00	470	200V	elect
C505, 605 C509, 609	1-130-085-00	0.22	100V	film
C550, 650 C551, 651	1-161-732-00	0.001	50V	ceramic (feed-through)

RESISTORS

All resistors are in μF. Common capacitors are omitted.
Refer to the list on the last page for their part numbers.
k : 1000Ω, M : 1000kΩ

Ref. No.	*Part No.*	*Description*		
R201	⚠1-246-521-00	100k	¼W	carbon
R202	⚠1-211-553-00	2.7k	¼W	carbon (nonflammable)
R203	⚠1-246-483-00	2.7k	¼W	carbon
R204	⚠1-246-469-00	680	¼W	carbon
R205	⚠1-246-507-00	27k	¼W	carbon
R206	⚠1-244-827-00	12	½W	carbon
R209	⚠1-217-198-00	0.68	2W	wirewound (nonflammable)
R301	⚠1-217-020-00	12	3W	wirewound (nonflammable)
R302	⚠1-202-725-00	3.3M	½W	composition
R403, 404	⚠1-213-136-00	270	1W	metal oxide (nonflammable)
R520, 620	⚠1-214-789-00	0.1	5W	metal plate (nonflammable)

Ref. No.	*Part No.*	*Description*
RV101, 151	1-226-817-00	20k-B, variable; PHONO LEVEL
RV201	1-224-251-XX	4.7k, adjustable; DC voltage
RV901	1-226-432-00	20k, adjustable; battery meter
RV902	1-226-430-00	5k, adjustable; power level meter
RV903	1-226-818-00	20k-B, variable; MIC FADER

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
ANT	1-501-228-00	TEL ANT
CNJ1	♠1-555-292-00	Cord, with 7p-connector
CNJ2	♠1-555-295-00	Cord, with 5p-connector
CNJ3	♠1-555-294-00	Cord, with 10p-connector
CNJ4, 801	♠1-555-297-00	Cord, with 10p- 12p-connector
CNJ5	♠1-555-300-00	Cord, with 5p-connector
CNJ101–103 CNJ151,152	1-507-687-00	Jack, 4p-phono; with FM CAR ANT jack; PHONO, REC OUT
CNJ104	1-507-567-21	Jack, 1p-phono
CNJ401	♠1-555-298-00	Cord, with 3p-connector
CNJ402	♠1-555-289-00	Cord, with 4p-connector

Note: Items marked "♠" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	*Part No.*	*Description*
CNJ403	🌢 1-555-299-00	Cord, with 5p-connector
CNJ701	🌢 1-555-293-00	Cord, with 6p-connector
CNJ802	🌢 1-555-288-00	Cord, with 3p-connector
CNJ803	🌢 1-555-296-00	Cord, with 7p-connector
CNP1	🌢 1-560-094-00	Pin, 7p-connector
CNP2	🌢 1-560-092-00	Pin, 5p-connector
CNP3, 4	🌢 1-560-097-00	Pin, 10p-connector
CNP5	🌢 1-560-092-00	Pin, 5p-connector
CNP104	1-551-664-00	Cord, with plug
CNP401	🌢 1-560-123-00	Pin, 3p-connector
CNP402	🌢 1-560-124-00	Pin, 4p-connector
CNP403	🌢 1-560-125-00	Pin, 5p-connector
CNP701	🌢 1-560-126-00	Pin, 6p-connector
CNP801	🌢 1-560-156-00	Pin, 12p-connector
CNP802	🌢 1-560-123-00	Pin, 3p-connector
CNP803	🌢 1-560-127-00	Pin, 7p-connector
F301	⚠1-532-579-00	Fuse, 4A
F302	⚠1-532-556-00	Fuse, thermal; 147°C 2A
F401	⚠1-532-578-00	Fuse, 2A
J401	1-507-689-00	Jack, HEADPHONES
J901	1-507-643-00	Jack, with switch; MIC
L201	⚠1-421-329-00	Coil, choke; 10μH
L202, 203	⚠1-421-370-00	Coil, choke; 10μH
L204	⚠1-421-329-00	Coil, choke; 10μH
L205, 206	⚠1-407-161-XX	Microinductor, 22μH
L501, 601	1-421-379-00	Coil, choke; 19.5μH
L502, 602	1-421-380-00	Coil, choke; 13.5μH
L801	1-407-592-00	Microinductor, 1.8μH
L802, 803	1-421-329-00	Coil, choke; 10μH
L804	1-543-100-00	Core
L805, 806	1-421-329-00	Coil, choke; 10μH
L808, 809	1-408-105-00	Microinductor, 1μH
ME901	1-520-422-00	Meter, POWER LEVEL/BATTERY
PL401	1-518-282-XX	Lamp, pilot; meter lighting
RY301	⚠1-515-317-21	Relay
RY401	1-515-379-00	Relay
RY402 RY501,601	1-515-317-00	Relay
S301	1-552-822-00	Switch, slide; ANTENNA
S801, 802	1-553-261-00	Switch, pushbutton; MUTING, PHONO
S901	1-552-730-00	Switch, pushbutton; POWER LEVEL/ BATTERY
T201	⚠1-421-328-11	Coil, choke; line filter
T202, 203	⚠1-543-100-00	Core
T204	⚠1-543-098-00	Core (yellow)
	⚠1-543-100-00	Core (blue)
T205	⚠1-543-100-00	Core
T206	⚠1-446-649-00	Transformer, converter
T401	1-421-369-00	Coil, choke
T801	1-446-533-00	Transformer, converter
T802	1-433-217-00	Transformer, OSC
TM401	1-561-532-00	Connector, 4p; SPEAKER
	⚠1-533-037-XX	Holder, fuse
	1-555-372-00	Cord, with connector; battery input
	1-560-530-00	Connector, 2p; DC IN 12V
	⚠1-560-531-00	Connector, 2p; AC IN

COMPLETE CIRCUIT BOARDS

🌢 A-3260-066-A	Power AMP
🌢 A-3271-066-A	Pulse Power Supply (B)
🌢 A-3271-078-A	Pulse Power Supply (A)
🌢 A-3279-119-A	Phono Switch
🌢 A-3279-121-A	System Control
🌢 A-3289-032-A	Jack

PRINTED CIRCUIT BOARDS

🌢 1-602-330-00	Switch
🌢 1-602-331-00	LED (A)
🌢 1-602-332-00	LED (B)
🌢 1-602-333-00	Rectifier

ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
1-506-305-00	Plug, F-type; FP-33
1-528-084-00	Battery Pack, BP-70
⚠1-532-510-00	Fuse, 8A
1-536-626-00	Terminal, 4p; speaker
⚠1-551-983-00	Cord, power
1-551-666-11	Cord, speaker; white line
1-551-666-21	Cord, speaker; red line
1-551-874-00	Cord, with terminal
🌢 1-555-327-00	Cord, with connector and fuse holder
🌢 1-555-358-00	Cord, connection
3-565-234-00	Bag, protection; set
3-569-941-00	Box, accessory
3-569-948-00	Pad, dust cover
3-569-957-00	Dust Cover
3-569-960-00	Screwdriver
3-569-967-00	Spacer
3-701-613-00	Bag, plastic; fuse, screwdriver
3-701-619-00	Bag, plastic; speaker 4p terminal
3-701-625-00	Bag, plastic; instruction manual
3-701-630-00	Bag, plastic; accessory
3-783-161-21	Manual, instruction

FM TUNER SECTION

FM FRONT-END

The antenna input signal is passed via C1 to the FM front-end where it is converted into an intermediate frequency (IF) output signal.

This electronic tuning type front-end operates in the FM band when an external DC voltage of 2.9 – 8.1V is applied. It also generates a local oscillator output signal for the crystal-lock PLL local oscillator frequency synthesizer.

The tuner may be tested separately when this tuning voltage is applied, but note that the muting circuit must also be disconnected.

Q1 (local oscillator buffer) operates in the local oscillator frequency region for the local FM band, i.e., upper-heterodyne 98.2 – 118.7MHz. The Q1 input level is about 300mVp-p, and the output level about 500mVp-p, sufficient to drive the following ECL prescaler. If a wide-range oscilloscope is not available, Q1 operation may be checked in the following way.

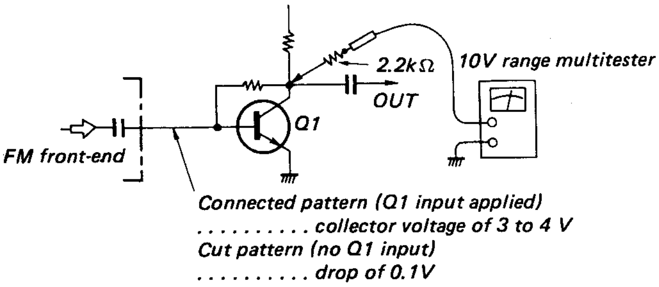

2.2kΩ
10V range multitester
OUT
Q1
FM front-end
Connected pattern (Q1 input applied)
.... collector voltage of 3 to 4 V
Cut pattern (no Q1 input)
.... drop of 0.1V

Fig. 1

Note: Connect the multitester to the Q1 collector via a 2.2kΩ resistor.

PRESCALER (IC401)

The local oscillator voltage passed via Q1 is then applied to the prescaler IC. IC401 is a frequency divider (prescaler) which divides the frequency by 8, thereby resulting in output frequencies of 12.275 – 14.8375MHz. The required minimum input level for IC401 is 150mV (rms).

Furthermore, in prescaler ICs where high speed frequency division is required, the IC must be designed with a minimum operational frequency in order for dynamic circuitry to be used in the logic in the vicinity of the input. In IC401 (CX554) this frequency is 0.1 – 1MHz.

Consequently, in order to check the frequency division operation, the frequency of the signal applied to the input by oscillator must exceed the above minimum frequency.

Note: A capacitor-couple sine wave may be applied to the input.

PLL FREQUENCY SYNTHESIZER (IC402)

IC402 (CX552) is a PLL frequency synthesizer used by the local oscillator. With a 12.5kHz phase detector (PD),

$$\text{Frequency step} = f_{PD}(12.5\text{kHz}) \times \text{prescaler divisor}(8) = 100\text{kHz}.$$

That is, local oscillator frequencies are synthesized in steps of 100kHz. The reference frequency employed in the PD stage is obtained from the external crystal oscillator (6.4MHz).

$$6400\,(\text{kHz})/12.5\,(\text{kHz}) = 512$$

That is, 12.5kHz is obtained by dividing 6.4MHz by 512. In CX552, the 3-digit local oscillator frequency is subject to time sharing and sequential setting. The local oscillator frequency is set by the BCD codes applied to the D, C, B, and A terminals, while the digit pulses are applied to the LOAD terminal in T1 – T4 timing in order to read the setting. See Fig. 2 for details.

Ex.: UP key pressed once when tuned to 98.9MHz.

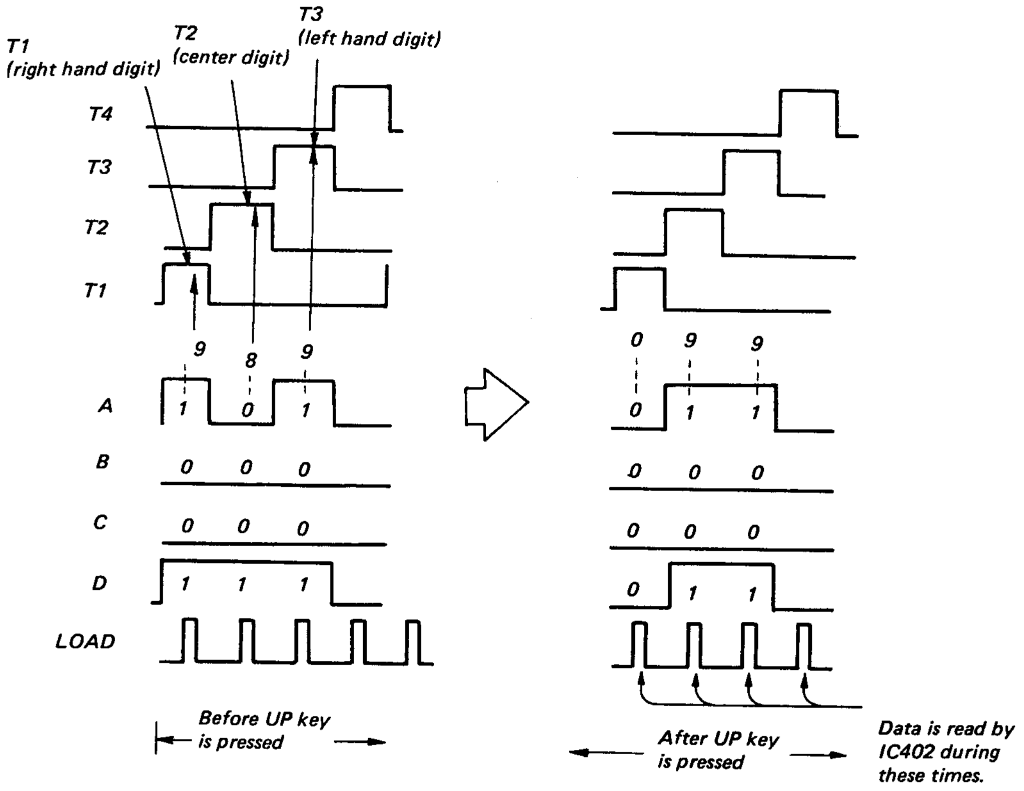

T1
(right hand digit)
T2
(center digit)
T3
(left hand digit)
T4
T3
T2
T1
9 8 9
A
1 0 1
B
0 0 0
C
0 0 0
D
1 1 1
LOAD
Before UP key is pressed
0 9 9
0 1 1
0 0 0
0 0 0
0 1 1
After UP key is pressed
Data is read by IC402 during these times.

Fig. 2

Note: Rather than the local oscillator frequency, it is the received frequency (as shown in Fig. 2 above) which is given, according to the instructions of IC402 (CX552). Accordingly, the internal IC code decoder prepares the frequency divisor for the generation of the local oscillator frequency (with 10.7MHz added), and subsequently controls the programmable counter.

- **Q402 and Q401**

  Q402 operates as an inverter employed in external muting while the PLL IC remains locked. When muting is required, a 0 level is generated at pin no. 18 (lockout) of this IC.

  Q401 serves as an active filter in the DC voltage circuit required in the control of the local oscillator frequency.

FM IF AMPLIFIER AND FM DECODER (IC1)

IC1 (HA12411) contains the FM IF amplifier and FM decoder stages. A DC output is produced in proportion to the input level. The major component stages include the IF amplifier, input level detector, limiter, quadrature detector, muting circuit, and AF amplifier.

The input level detector output is passed via pin no. 13 and applied to IC505 for level display purposes.

The quadrature detector employed here needs to be explained in a little more detail. In this so-called "phase multiplier" quadrature detector, 2 separate FM signals of different phases are applied to a multiplaying circuit, and demodulation components are obtained from the output beat components. The principal part of this detector is the pair of balanced switching circuits shown below.

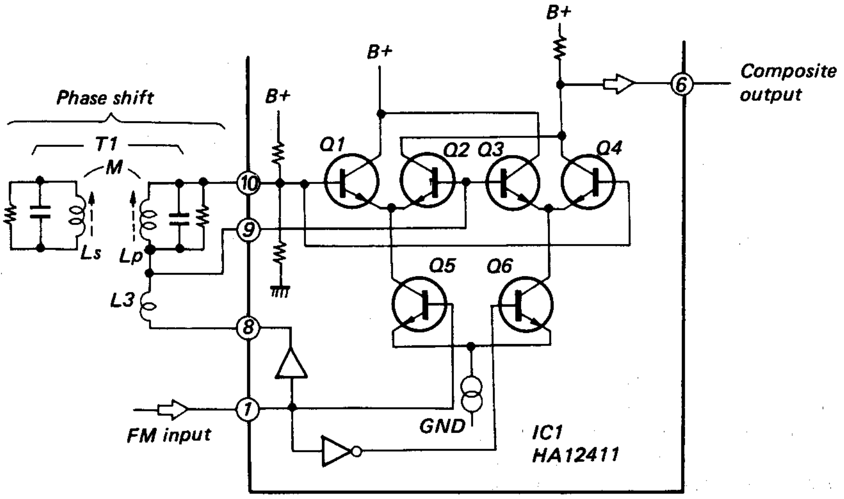


Fig. 3

This circuit may also be considered a kind of simplified phase shift circuit commonly referred to as a double balance modulator (DBM).

When there is no phase shift, Q1 – Q4 will be switched alternately by Q5 and Q6. Once Q1 – Q4 are perfectly balanced, there will be no carrier input component generated in the output.

Because of the dependence of the output upon the phase of Q1 – Q4, this circuit has the following characteristics:

Demodulation center frequency (fr) .... determined by Lp

Demodulation sensitivity . . .proportional to Q of Lp and inductance of L3.

Demodulation linearity. . . . .changed by Lp phase shift curve, and corrected by M coupled Ls side.

See diagramatic explanation in Fig. 4.

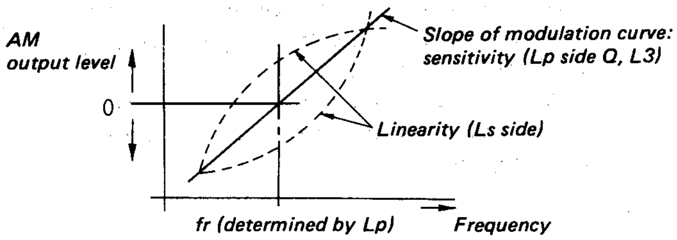


Fig. 4

FM NOISE CANCELLER (IC2)

The purpose of IC2 (μPC1176C) is the removal of pulse noise generated by the engine and similar mechanisms. After the composite signal is prepared by the decoder IC described above, noise is removed by this IC2.

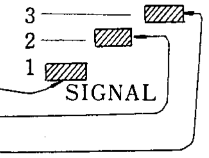
The composite signal contains the 0 – 15kHz L + R (FM) signal plus the 19kHz pilot signal and the 38kHz subcarrier L – R (AM) signal. But it is inconvenient to have the high frequency signals required for subsequent left and right decoding removed along with the noise at separate stages, so this IC has been equipped with a stereo signal holding circuit.

POWER SUPPLY STAGE

The constant voltage circuit maintains the B+ input voltage (which tends to rise when engine rpms are increased) at a constant voltage.

LEVEL DISPLAY (IC505)

Upon reception of the input level display input signal from IC1, IC505 (M51903L) is employed in the display of this level via 3 LEDs. The following terminals of this IC are switched to LOW level depending on the DC input level, which ranges from 0.23V to 1V.

DC Input (4)	Terminals switched to LOW level	Display
~0.23V	—	
0.23V	⑥	
0.45V	⑥⑦	
0.66V	⑥ ~ ⑧	
0.86V	⑥ ~ ⑧①	
1.0V	⑥ ~ ⑧①②	

In this unit, output terminals ⑦ , ① and ② are used for level display purposes, while terminal ⑧ is used for other control purposes.

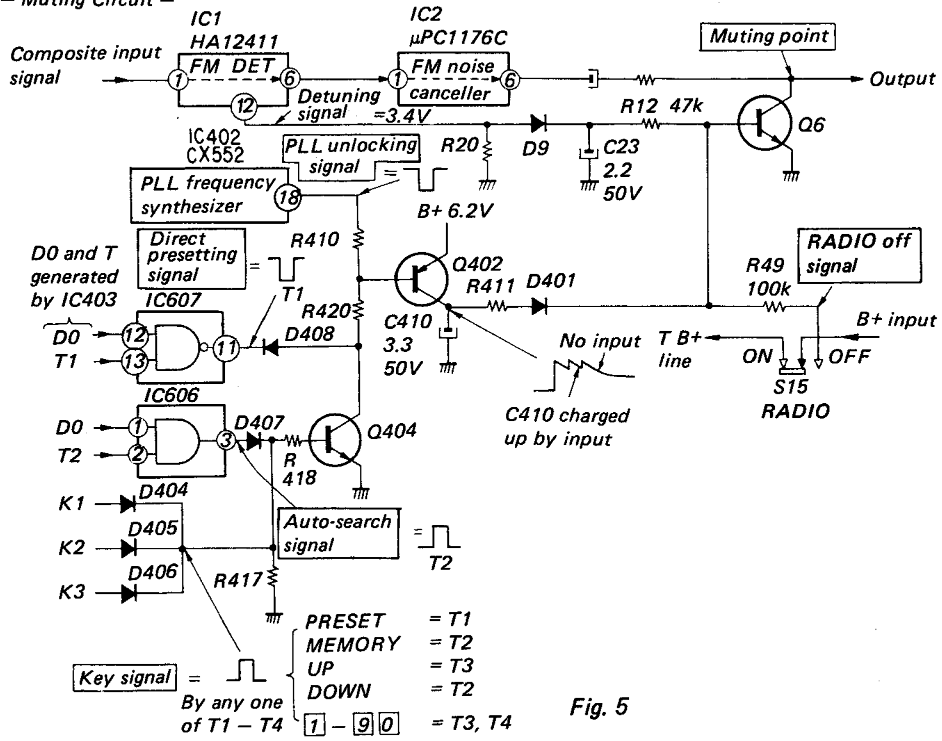
MUTING

The muting circuit is applied (audio outputs blocked) when:

- the input level of the broadcast signal is too low.
- the various controls and selectors are switched **(including turning the RADIO switch on and off).**
- during scanning operations following switching of relevant controls.

During repairs, the muting circuit must be disconnected in order to be able to check defects in all possible positions.

– Muting Circuit –



IC1
HA12411
FM DET
Composite input signal
IC2
μPC1176C
FM noise canceller
Muting point
Output
Detuning signal =3.4V
R12 47k
Q6
IC402
CX552
PLL frequency synthesizer
PLL unlocking signal
R20
D9
C23
2.2
50V
B+ 6.2V
Direct presetting signal
R410
D0 and T generated by IC403
IC607
T1
R420
D408
Q402
R411
D401
RADIO off signal
R49
100k
B+ input
D0
T1
C410
3.3
50V
No input
T B+ line
ON
OFF
S15
RADIO
C410 charged up by input
IC606
D0
T2
D407
Q404
R
418
K1
D404
K2
D405
K3
D406
R417
Auto-search signal
T2
Key signal
By any one of T1 – T4
PRESET = T1
MEMORY = T2
UP = T3
DOWN = T2
1 – 9 0 = T3, T4

Fig. 5

SYSTEM CONTROLLER (IC403)

IC403 (CX553) is employed in the control of all systems. It contains memory circuits for up to 10 separate broadcasting frequencies, these being supplied continuously by B+ via the back-up line. This back-up power supply is employed in the following cases:

- When the RADIO switch has been turned off.
- When pin 11 [INH: inhibit] is switched from H (high) level to L (0V), thereby deactivating all IC403 inputs and outputs. In this case, only the memory circuits will be supplied.
  The memory stage B+ is supplied continuously from the back-up line via pin no. 28 (B+).

● MHz Display Speed

The MHz display is a dynamic display. This means that the display signals are "time shared" by the digit signal T1 – T4 for the display of 4 digits (3 effective digits). The T1 – T4 switching speed is determined by C412 and R416 connected to pin no. 9 (pin no. 9 oscillation/16 = T1 – T4).
Vibrations generated when driving the car result in a certain amount of flickering in the display. As this unit has been designed specifically for use in a car, the frequency at pin no. 9 is set to about 5kHz.

● Scanning Speed

Scanning speed is determined by C411 and R415 connected to pin no. 10 (about 12 pulses/sec). The relation between this speed and various operational modes is as follows. If the frequency at pin no. 10 is "f", then the time required to shift to the scanning mode after pressing the UP or DOWN key will be 20/f (sec). The scanning step f (step) and the time required for a memory to become resettable will be 64/f (sec).

● CX553 Functions and Operation
Input/Output Timing Centered in T1 – T4

With CX553, practically all inputs and outputs are synchronized with the T1 – T4 digit signals. The A – D frequency data outputs and the D0 – D3 display outputs are varied according to the T1 – T4 timing and subsequently transferred as dynamic data. Furthermore, the K1 – K5 key signal inputs and the U/L band switching input are also synchronized with the T1 – T4 timing within the LSI, followed by the subsequent reading in of the data. The meaning of the instructions differs with different timing. The assignment of the various timings at the input and output terminals of T1 – T4 are listed in Table 1.

Input/Output Table

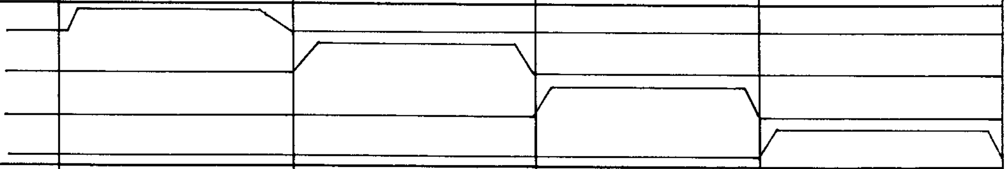
Symbol	Assignment	T1	T2	T3	T4
T1					
T2					
T3					
T4					
A	Data output	Tuned 1	Tuned 10	Tuned 100	Tuned frequency data 1000
B	to CX552	frequency 2	frequency 20	frequency 200	Reception mode designation output (not used in this set)
C	and tuned	data 4	data 40	data 400	
D	frequency display	x 1 digit 8	x 10 digit 80	x 100 digit 800	
D0	Operational mode memory read out, display output	Direct presetting	FM decimal point	Auto-search tuning	Memory write
D1		Memory-1	Memory-2	Memory-3	Memory-4
D2		Memory-5	Memory-6	Memory-11	Memory-12
D3		Memory-7	Memory-8	Memory-9	Memory-10
K1	Operation key signal input	FM$_E$ mode	Auto-search instruction	1	2
K2		Direct presetting	Memory write	3	4
K3		Display dimmer	Clock switching	5	6
K4		Key lock		DOWN	UP
K5		AM mode designation	FM mode designation	n + 6 operation	n + 6 operation
U/L	Reception mode switching input			FMU designation	AM2 designation

Table 1

- **CX553 Terminal Functions**

Pin No.	Symbol	Terminal Name and Function
①	GND	Ground
② – ⑥	K1 – K5	Key signal inputs: capacity for a total of 20 different instructions, employing each of the operation key inputs and the operation designation inputs, which differ according to the T1 – T4 timing.
⑦	U/L	Reception mode input: permits designation of FM heterodyne system and AM step frequencies.
⑧	S/C	Description deleted.
⑨	OSC1	Master clock: determination of clock frequency employed in control of all systems.
⑩	OSC2	Sub clock: Determination of clock frequency employed in setting the timing for auto-scan speed, memory write-in time, etc.
⑪	$\overline{\text{INH}}$	Inhibit: inhibit input employed when using memory back-up.
⑫	SCAN STOP	Scan stop: stop input signal used during auto-scan mode.
⑬	FM/AM	FM/AM switching output: FM = 1, AM = 0.
⑭	LOAD	PLL IC load signal output: data read-in timing indicator output.
⑮ – ⑱	A – D	Frequency data output: 4-digit BCD code synchronized serially with T1 – T4
⑲ – ㉒	T1 – T4	Digit output: K1 – K5, A – D, D0 – D3 timing control output
㉓	BL	Display blanking output: dynamic drive output, which is also used in determining degree of brightness.
㉔ – ㉗	D0 – D3	Mode display output: memory read out address, auto-scan, and memory write-in display outputs (including display driver).
㉘	B+	

Note: All inputs and outputs are synchronized with T1 – T4 by the master clock.

Table 2

MHz DISPLAY

Although the MHz display contains 3 effective digits, 4 digits, including the unrequired digit in the left hand position, will appear when the 0 – 9 numerals are pressed in succession during presetting operations. The circuitry involved when this extra digit appears is described below. The main circuit components employed include IC501, diodes D501 – D503 connected to the IC input side, and the display switch Q501 – Q504.

- IC501 is a BCD/7-segment decoder which converts the digit numeral data from IC403 into a 7-segment code.
- Q501 – Q504 are employed in a power buffer and inverter stage, preparing digit signals by matching the signal T1 – T4 (used in the time sharing of each digit) on the LED (–) common terminal. In other words, T1 – T4 are prepared on the collector.
- D501 – D503 are switched on by Q504 only at T4 time. In other words, D, C and B within the IC501 input BCD code are set to zero ("0") within the T4 timing. This is because the T4·D – T4·B addresses in the CX553 controller input/output table (see page 38) are not required.

INPUT NUMERAL KEYS

Besides being used directly in designating the corresponding memory channel, the 0 – 9 keys may also be used as simple input numeral keys. The IC403 (CX553) controller accepts these inputs, which use T3 and T4 timing in the following manner:

T3·K1 = 1
T3·K2 = 3
T3·K3 = 5

Furthermore, by adding T3 to K5 at the same time, +6 is added to the above inputs. That is, 1, 3 and 5 become 7, 9 and 11, although 11 is not used.

T4·K1 = 2
T4·K2 = 4
T4·K3 = 6

And by adding T4 to K5, +6 is added to the above, resulting in 2, 4 and 6 becoming 8, 10 (for 0 display) and 12, which is not used.

In this way, memory channel designation and direct presetting are achieved by the 0 to 9 numeral inputs.

4BIT ADDER

Memory channel display and other functions are performed with IC502 (4008), coupled to preceeding diode gates and AND and NAND ICs. This IC performs binary input additions with carry operations, and is capable of generating digit carry signals for external use. It is generally known as a half adder IC. The memory channel read out indicator output from CX553 ensures that only one of the 12 channel outputs will appear in the T1 – T4 timing set by D1 – D3.

The set has been equipped with 7-segment LED display elements for use in channel display. Consequently, it is necessary to obtain the display signal input source in binary form. But since the controller is involved with display outputs not in binary form as far as the memory read-out is concerned, this output has to be accurately encoded to binary form. This complex binary encoding process is described below. The following diagram outlines the circuit in the IC502 half adder.

Connections to IC502

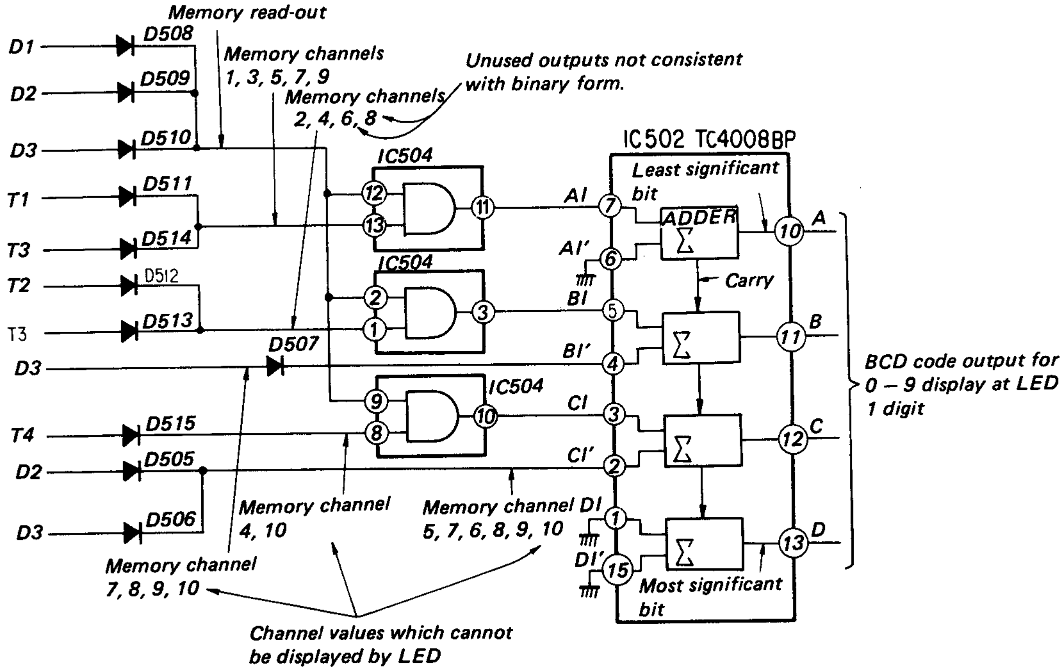

Memory read-out
D1
D508
D2
D509
D3
D510
T1
D511
T3
D514
T2
D512
T3
D513
D3
D507
T4
D515
D2
D505
D3
D506
Memory channels 1, 3, 5, 7, 9
Memory channels 2, 4, 6, 8
Unused outputs not consistent with binary form.
IC504
IC504
IC504
IC502 TC4008BP
Least significant bit
ADDER
Carry
AI
AI'
BI
BI'
CI
CI'
DI
DI'
A
B
C
D
Most significant bit
BCD code output for 0 – 9 display at LED 1 digit
Memory channel 4, 10
Memory channel 5, 7, 6, 8, 9, 10
Memory channel 7, 8, 9, 10
Channel values which cannot be displayed by LED

Fig. 6

Operation in this stage involves the binary adder. First, the A1 – D1' inputs prior to addition in the previous diagram are tabulated in the following table. These inputs will be easier to comprehend by ignoring the T1 – T4 timing at this stage.

AI ~ DI' / Memory Channel	DI DI'	CI CI'	BI BI'	AI AI'
1	0 0	0 0	0 0	1 0
2	0 0	0 0	1 0	0 0
3	0 0	0 0	1 0	1 0
4	0 0	1 0	0 0	0 0
5	0 0	0 1	0 0	1 0
6	0 0	0 1	1 0	0 0
7	0 0	0 1	0 1	1 0
8	0 0	0 1	1 1	0 0
9	0 0	0 1	1 1	1 0
10 (0)	0 0	1 1	0 1	0 0

Next, the additions (with internal carry operations) at the time of these inputs are shown. Since these are binary additions,

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 0 (with carry generated)

Hence the above table may be summarized in the following way.

	D	C	B	A
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
		Carry ←	Carry ←	
8	1	1+1 = 0	1+1 = 0	0
		Carry ←	Carry ←	
9	1	1+1 = 0	1+1 = 0	1
		Carry ←		
10(0)	1	1+1 = 0	1	0

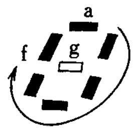
Outputs as BCD code 1 – 10

Although 1010 = 10 in BCD form, take note of the possibility of a simple 10101 output

The output is next applied to the BCD/7-segment decoder (IC503). 1 to 9 are completely decoded and displayed as 7 segment numbers.
When there is a 1010 input, it is decoded in the following way by the TC5022BP decoder IC.

Input D	C	B	A	Output a	b	c	d	e	f	g
1	0	1	0	1	1	1	1	1	1	0

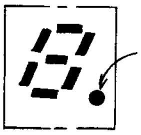
In other words, this input is displayed as a zero.



Hence, an adding circuit has been formed which satisfies with the TC5022BP input demands.

MEMORY WRITE-IN DISPLAY

The time denoting permissible memory write-in is indicated by the small "dot" LED in the memory channel display.

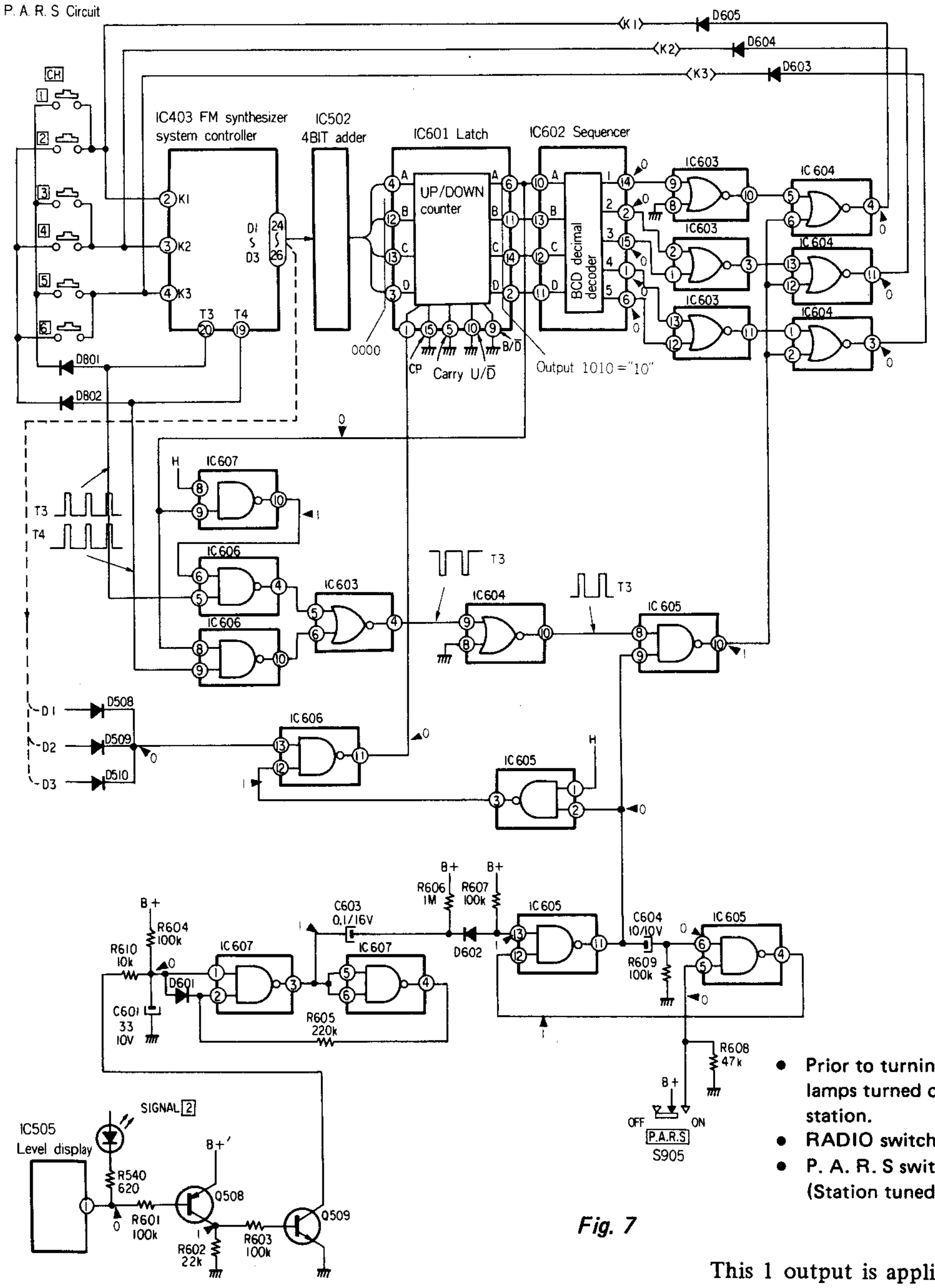


Indicates that memory write-in is permitted.

The signal used for this purpose is obtained by AND operation (at IC504) of the D0 and T4 addresses (memory write as indicated in the controller IC (CX553) input/output table). The signal is passed via Q505.

P. A. R. S (PROGRAMMABLE AUTOMATIC RECEPTION SYSTEM)

If the strength of the preset station presently tuned weakens, P. A. R. S will tune automatically to the nearest sufficiently strong preset station. This operation is executed by memory channel switching, the switching route being outlined in Fig. 7 below.


P. A. R. S Circuit
CH
1
2
3
4
5
6
IC403 FM synthesizer system controller
K1
K2
K3
D1 ∫ D3
T3
T4
IC502 4BIT adder
IC601 Latch
UP/DOWN counter
IC602 Sequencer
BCD decimal decoder
0000
CP
Carry U/D
B/D
Output 1010 = "10"
IC603
IC604
IC605
IC606
IC607
D601
D602
D603
D604
D605
D801
D802
D508
D509
D510
D1
D2
D3
H
R604 100k
R610 10k
C601 33 10V
C603 0.1/16V
R606 1M
R607 100k
R605 220k
C604 10/10V
R609 100k
R608 47k
B+
OFF
ON
P.A.R.S
S905
IC505 Level display
SIGNAL 2
R540 620
R601 100k
R602 22k
R603 100k
Q508
Q509

- Prior to turning RADIO switch off, all SIGNAL lamps turned on by level of manually tuned station.
- RADIO switch turned on.
- P. A. R. S switch is off at this time. (Station tuned manually)

Fig. 7

- IC601 BCD decimal down counter is set to the maximum of "10" when RADIO switch is turned on.
- This "10" data is applied to the sequencer input, but rather than the output for this number, 1 – 5 outputs become zero.
- The IC602 outputs are applied to the IC603 components, and the 3 NOR outputs are set to 1.

This 1 output is applied to the IC604 components (responsible for forming K1 – K3), resulting in the 3 NOR gates being closed. The K1 – K3 outputs are all set to zero, which means no control signals are sent to the controller.

- Although the T3 waveform is formed for signal strengths of more than 2 , this is invalidated by the sequencer outputs all being set to zero.
- Since the memory channels are not involved in this operation, there will be no memory read outputs D1 – D3 nor any down counter input. The counter will thus remain at "10".

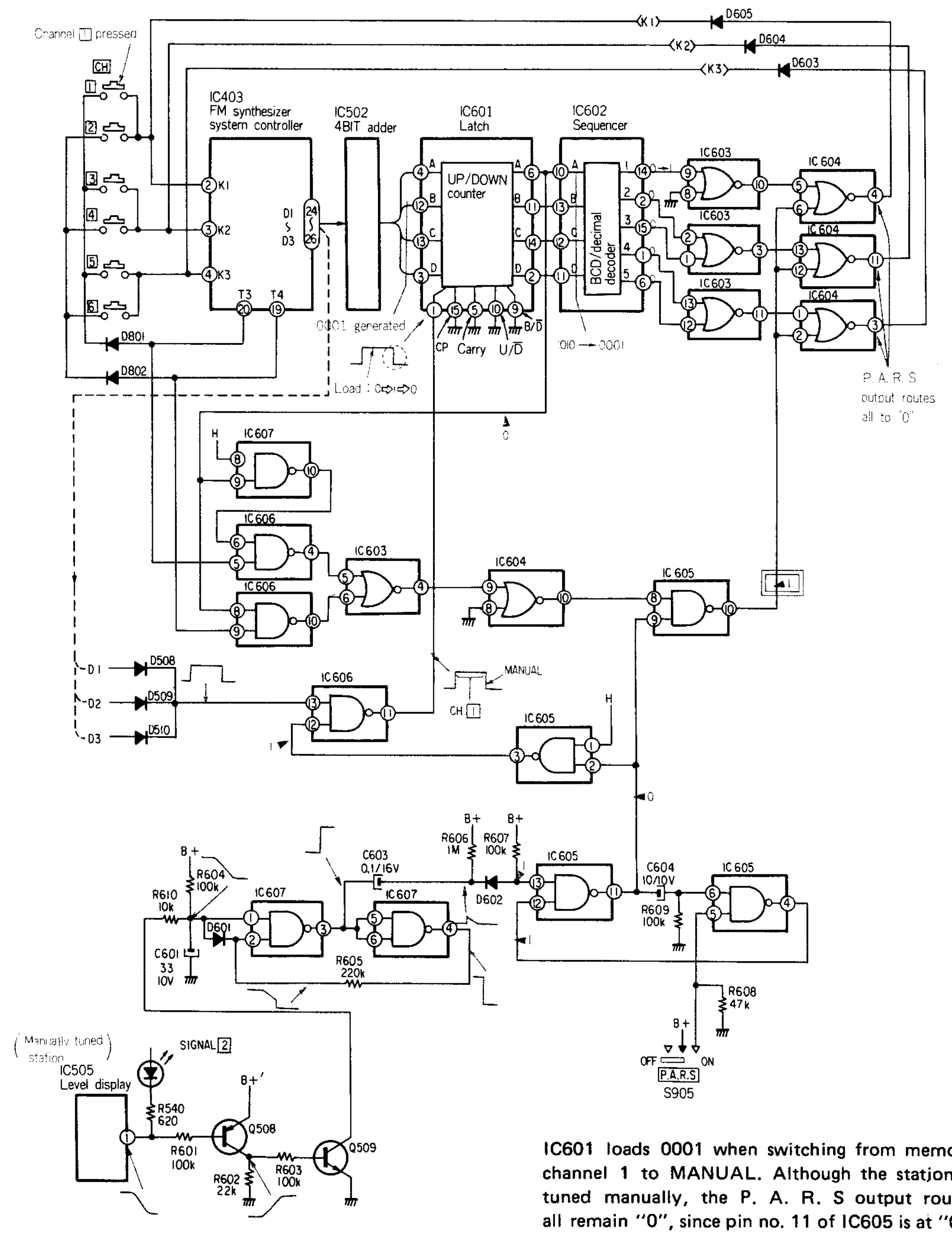
Station frequencies stored in the memory channels are recalled by P. A. R. S one by one.

Depending on the locality through which one is driving, the stations in that area may be stored in proper sequence in memory channels 1 to 6 by a direct presetting is pressed first to start the P. A. R. S operation. Once memory channel 1 has been pressed, that channel will be stored in the P. A. R. S circuit, so that even if stations apart from those stored in memory channels 1 to 6 are tuned before going on a long drive again, the P. A. R. S mode will still operate.

The circuitry involved when starting as described above is outlined in Fig. 8.

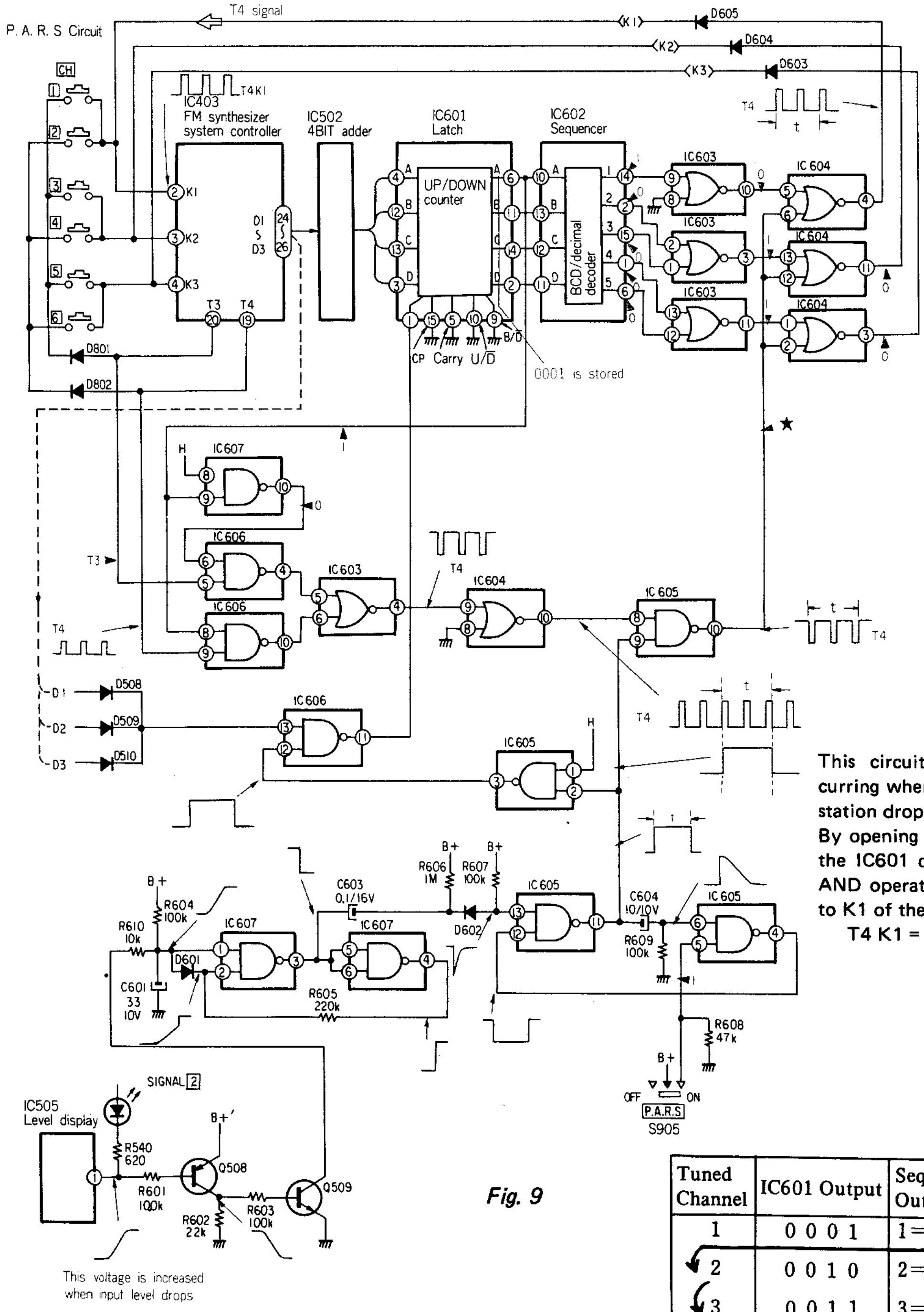
Note that IC601 stores the number of the last pressed memory channel after the RADIO switch is turned on (0001 = "1" in the circuit diagram). Since that number is distributed by the IC602 sequencer, the number is treated by the IC601/IC602 combination as a channel memory set. That channel number is then applied to IC601 by the controller IC, as the tuned channel.

P. A. R. S Circuit


Channel 1 pressed
CH
1
2
3
4
5
6
D801
D802
IC403
FM synthesizer system controller
K1
K2
K3
D1 ∫ D3
24 ∫ 26
T3 T4
20 19
IC502
4BIT adder
IC601
Latch
UP/DOWN counter
A B C D
CP Carry U/D
B/D
0001 generated
Load : 0⇨1⇨0
IC602
Sequencer
BCD/decimal decoder
0010 → 0001
K1 D605
K2 D604
K3 D603
IC603
IC604
P. A. R. S output routes all to "0"
H
IC607
IC606
IC603
IC604
IC605
D1 D508
D2 D509
D3 D510
IC606
MANUAL
CH 1
IC605
H
0
B+ B+
R606 1M
R607 100k
C603 0.1/16V
D602
IC605
C604 10/10V
IC605
R609 100k
R608 47k
B+
B+
R604 100k
R610 10k
IC607
IC607
D601
C601 33 10V
R605 220k
OFF ON
P.A.R.S
S905
Manually tuned station
SIGNAL 2
IC505
Level display
R540 620
B+'
Q508
Q509
R601 100k
R602 22k
R603 100k

IC601 loads 0001 when switching from memory channel 1 to MANUAL. Although the station is tuned manually, the P. A. R. S output routes all remain "0", since pin no. 11 of IC605 is at "0".

If the input level of the manually tuned station then drops, and SIGNAL 2 lamp turns off, the P. A. R. S circuit will commence to search for the nest strong channel. This operation is outlined in Fig. 9.


P. A. R. S Circuit
T4 signal
K1
K2
K3
D605
D604
D603
CH
T4K1
IC403
FM synthesizer system controller
IC502
4BIT adder
IC601
Latch
IC602
Sequencer
UP/DOWN counter
BCD/decimal decoder
CP Carry U/D
B/D
0001 is stored
IC603
IC604
IC605
IC606
IC607
D1 S D3
T3
T4
D801
D802
D508
D509
D510
H
0
t
B+
R604 100k
R610 10k
C601 33 10V
D601
C603 0.1/16V
R605 220k
R606 1M
R607 100k
D602
C604 10/10V
R609 100k
R608 47k
OFF ON
P.A.R.S
S905
SIGNAL 2
IC505 Level display
R540 620
R601 100k
R602 22k
R603 100k
Q508
Q509
This voltage is increased when input level drops

This circuit diagram indicates the changes occurring when the input level of the manually tuned station drops.
By opening the gates marked with an asterisk (★), the IC601 data and T4 time pulse are subject to AND operation, and the resultant output is passed to K1 of the controller.
T4 K1 = memory channel 2 read out

Fig. 9

When there is a drop in the input level of the tuned station, and the P. A. R. S switch has been turned on (as shown in Fig. 9), the next channel after the last pressed memory channel (1 in this case) will then be tuned.

Input level drops.

Even if wishing to continue listening to channel 1, channel 2 will be tuned in automatically as a result of temporary signal level drops when passing through a tunnel, etc. In this case, simply press channel 1 again. The IC601 memory may be reset.

Tuned Channel	IC601 Output	Sequencer Output	T Output and Route	Channel Selected after Gate Closure
1	0 0 0 1	1=HIGH	T4 K1	2
2	0 0 1 0	2=HIGH	T3 K2	3
3	0 0 1 1	3=HIGH	T4 K2	4
4	0 1 0 0	4=HIGH	T3 K3	5
5	0 1 0 1	5=HIGH	T4 K3	6

Switching to subsequently channels is outlined in the following table.

When the input level for channel 6 drops, channel 6 will remained tuned, since all outputs of sequencer IC602 will be zero.

Channels 7 to 9 and 0 are connected to K5 of the controller, but since these routes are not connected to the P. A. R. S circuit, there will be no P. A. R. S operation for these channels.

DYNAMIC LOAD

Q14 and Q15 in the power supply stage serve as loads employed in automatic changing of resistance. Since the tuner is supplied by B+ from the car battery, the pulsating B+ current supplied to other parts will become noise. This circuit is designed to eliminate this noise.

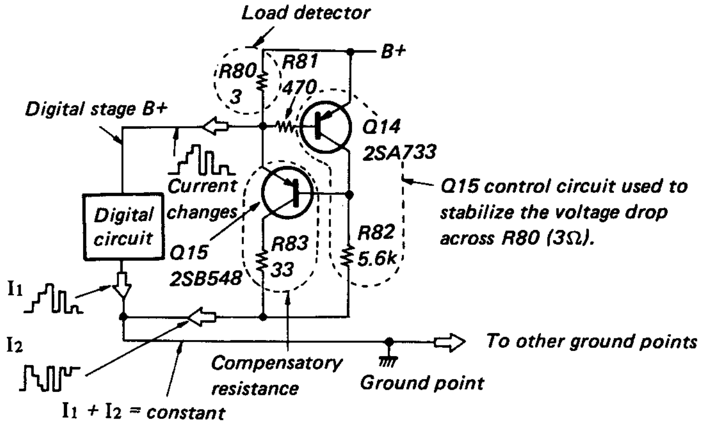
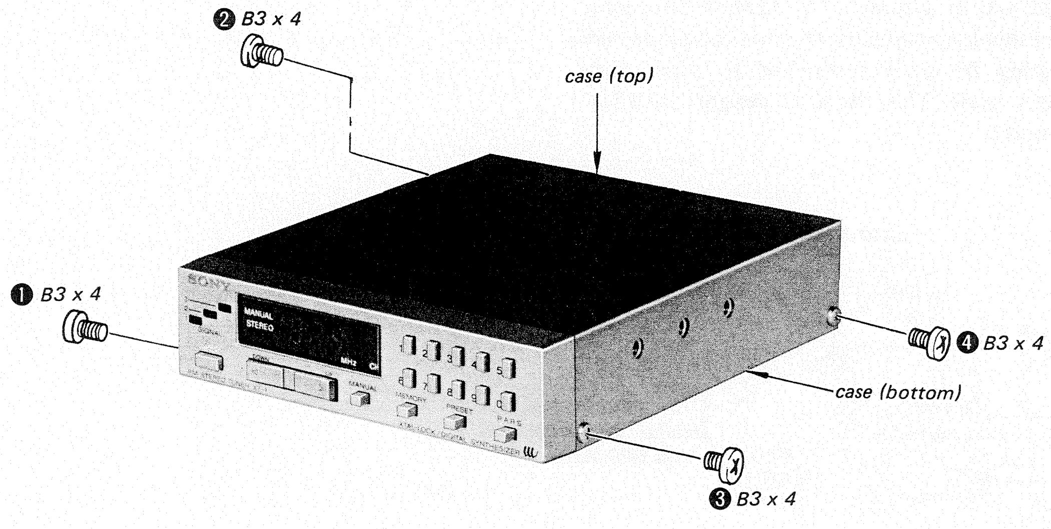

Load detector
B+
R80
3
R81
470
Digital stage B+
Q14
2SA733
Current
changes
Digital
circuit
Q15
2SB548
R83
33
R82
5.6k
Q15 control circuit used to stabilize the voltage drop across R80 (3Ω).
I1
I2
To other ground points
Compensatory
resistance
Ground point
I1 + I2 = constant

Fig. 10

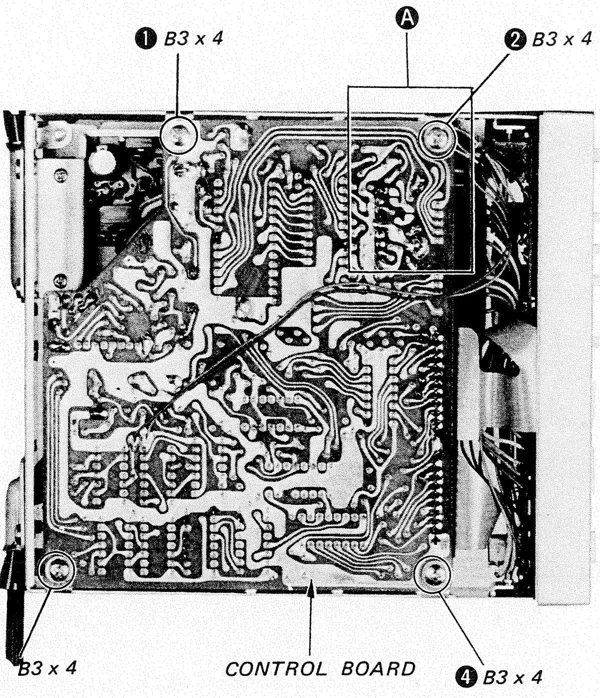
SECTION 2
DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

TOP CASE REMOVAL


❷ B3 x 4
case (top)
❶ B3 x 4
❹ B3 x 4
case (bottom)
❸ B3 x 4

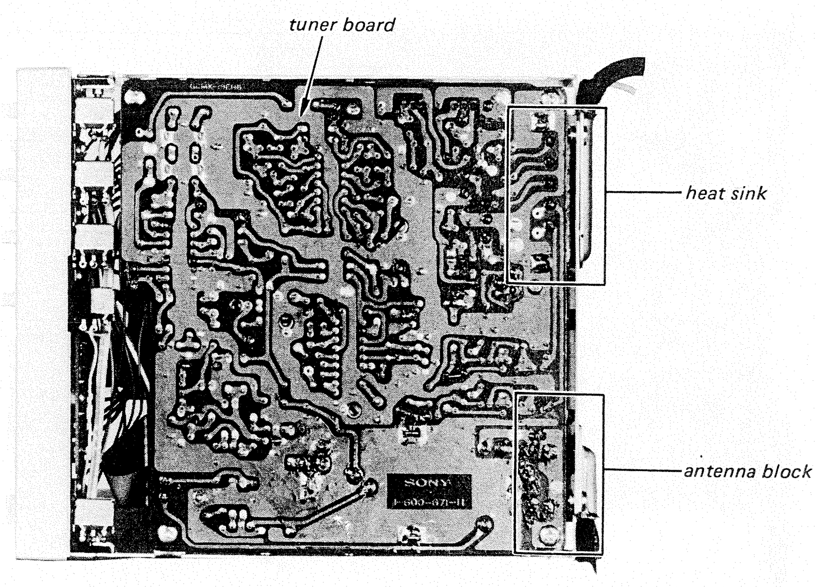
CONTROL BOARD REMOVAL


❶ B3 x 4
Ⓐ
❷ B3 x 4
B3 x 4
CONTROL BOARD
❹ B3 x 4

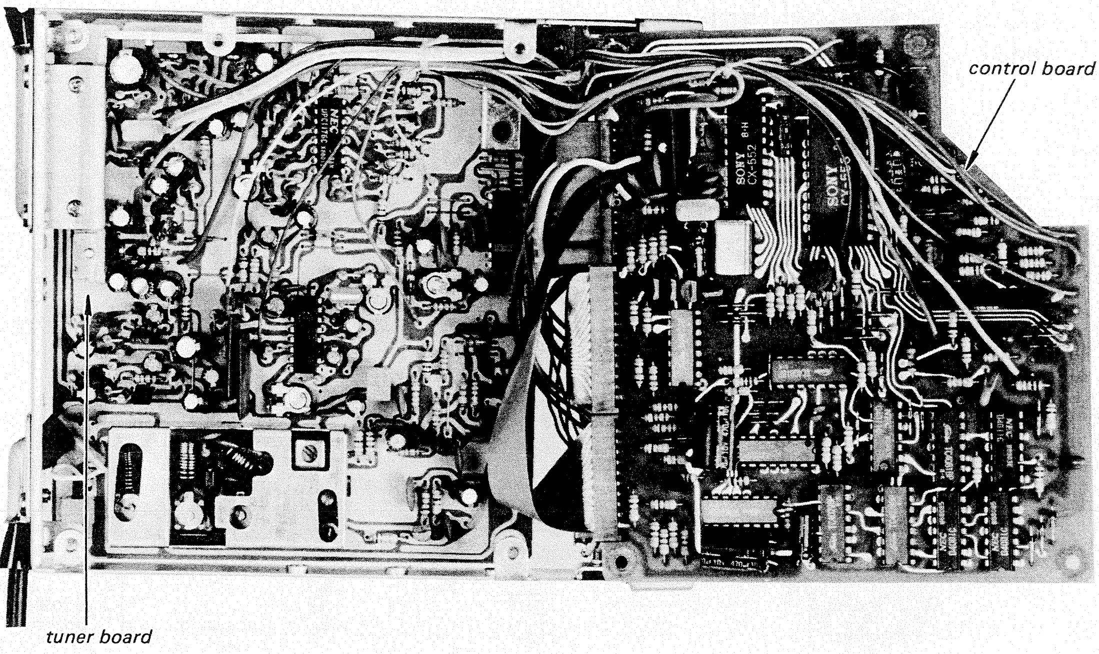
Note: When install, do not press the portion marked by Ⓐ

TUNER BOARD

The tuner board can be repaired without removal.

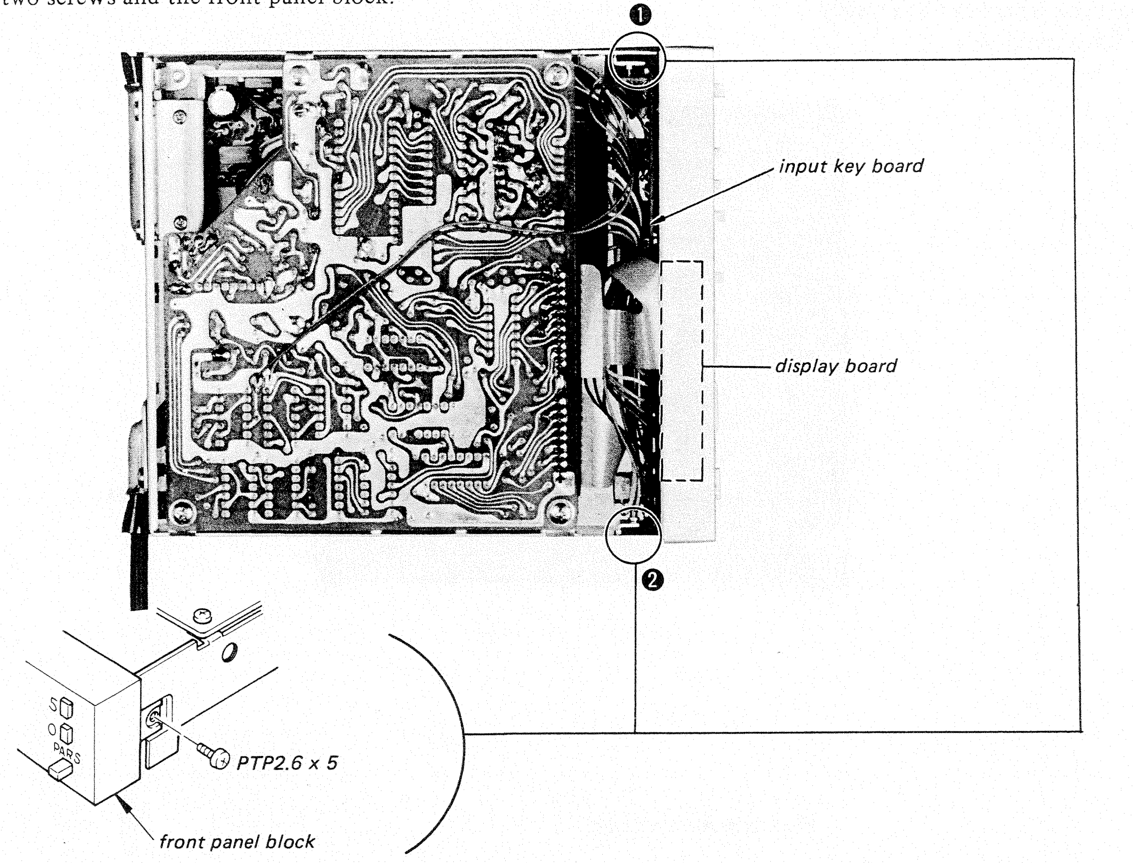

tuner board
heat sink
antenna block

— View from mounted side —

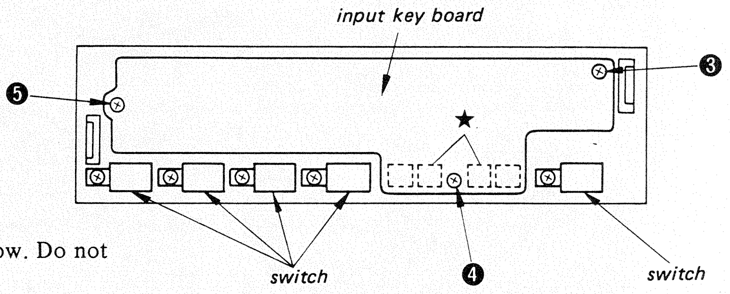

control board
tuner board

DISPLAY & INPUT KEY BOARD REMOVAL

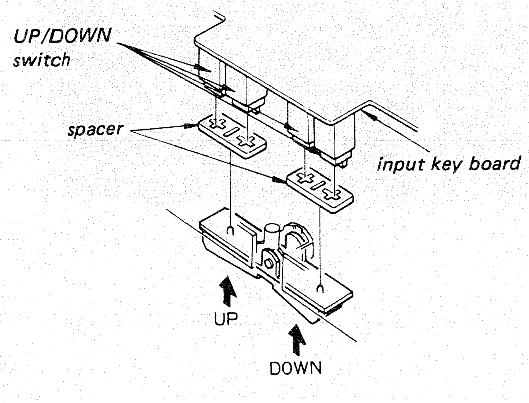
Remove two screws and the front panel block.

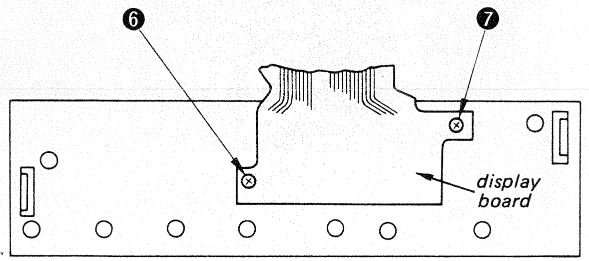

❶
input key board
display board
❷
PTP2.6 x 5
front panel block
5
0
PARS

Place the set horizontally, facing the tuner board upward.


input key board
❺
❸
★
switch
❹
switch

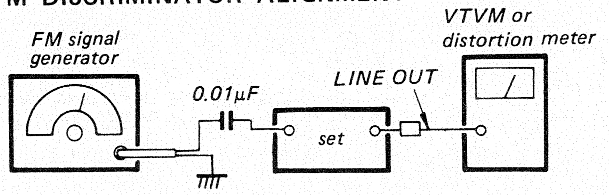
The portion marked by ★, is illustrated below. Do not remove the spacers.


UP/DOWN switch
spacer
input key board
UP
DOWN

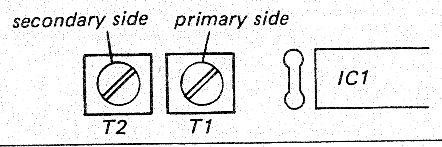

❻
❼
display board

SECTION 3
ADJUSTMENTS

FM DISCRIMINATOR ALIGNMENT

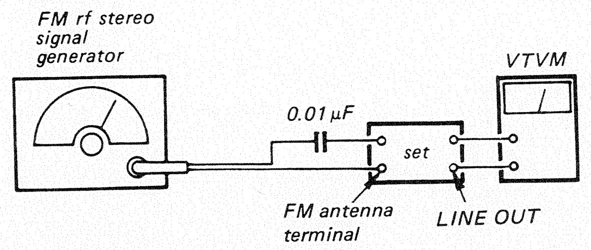

FM signal generator
0.01μF
set
LINE OUT
VTVM or distortion meter

FM IF ALIGNMENT (10.7MHz)	
T1 (primary)	Adjust the core for a maximum reading.
T2 (secondary)	Adjust the core for a minimum reading.


secondary side
primary side
T2
T1
IC1

FM Stereo Separation Adjustment

Procedure:


FM rf stereo signal generator
0.01μF
set
FM antenna terminal
LINE OUT
VTVM

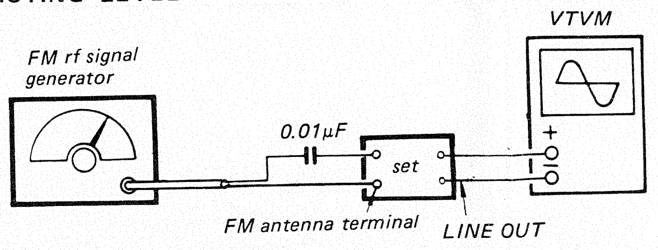
Carrier frequency: *98 MHz*
Output level: *1 mV (60 dB)*
Mode: *Stereo*
Modulation:
Audio (400 Hz): 67.5 kHz deviation (90%)
Pilot (19 kHz): 7.5 kHz deviation (10%)

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RV4 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RV4 for minimum reading.

L-CH Stereo separation: Ⓐ – Ⓑ
R-CH Stereo separation: Ⓒ – Ⓓ

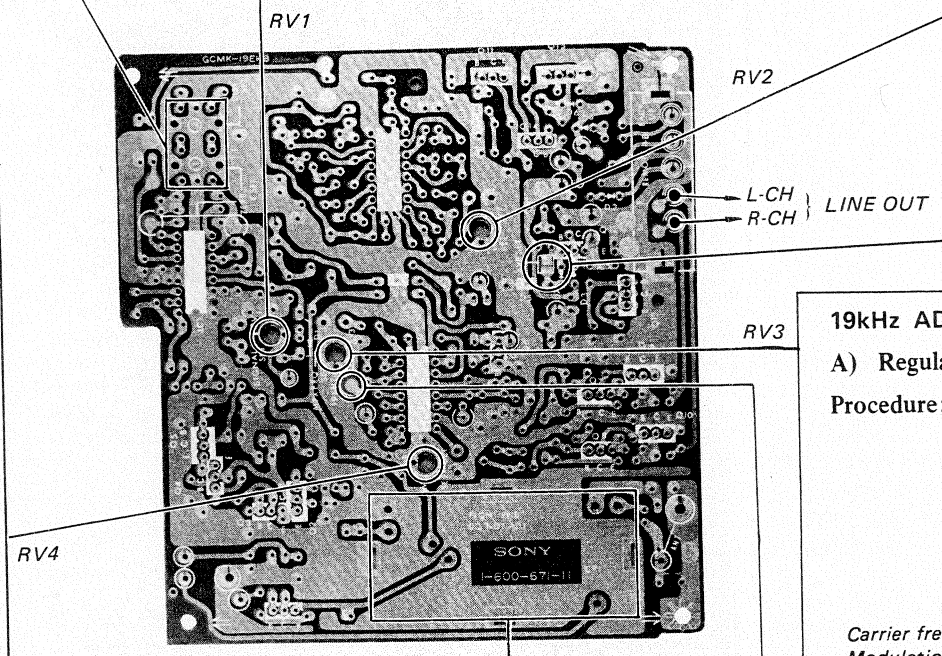
The difference between the separations of both channels should be within equal.

MUTING LEVEL ADJUSTMENT


FM rf signal generator
0.01μF
set
FM antenna terminal
LINE OUT
VTVM

Carrier frequency: *98MHz*
Modulation: *400Hz, 75kHz deviation (100%)*
Output level: *5μV (14dB)*

Turn RV1 and stop it just when the VTVM indication suddenly decreases.


RV1
RV2
L-CH
R-CH
LINE OUT
RV3
RV4
SONY

FM FRONT END ADJUSTMENT

No adjustment is needed.
Replace the Front End Unit when defective.

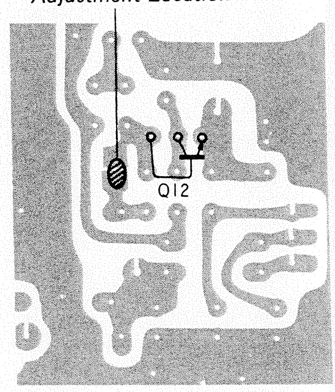
NOISE CANCELLER ADJUSTMENT

No adjustment is needed.
Set RV2 to the center position when replaced.

B+ ADJUSTMENT

Apply 12V DC to B+ input. Solder or unsolder the pattern so that the emitter voltage at Q12 is 9V.

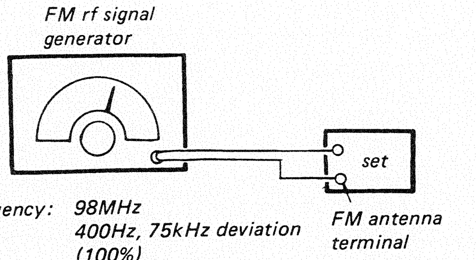
Adjustment Location



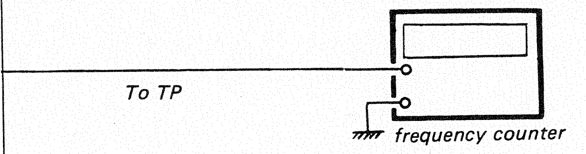
19kHz ADJUSTMENT

A) Regular Method

Procedure:


FM rf signal generator
set
FM antenna terminal

Carrier frequency: *98MHz*
Modulation: *400Hz, 75kHz deviation (100%)*
Output level: *1mV (60dB)*

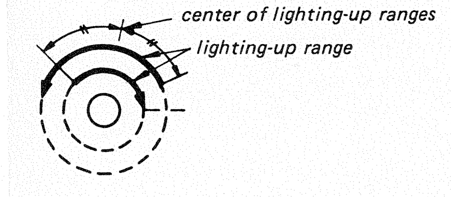

To TP
frequency counter

1. Tune the set to 98 MHz.
2. Adjust RV3 for 19 kHz ± 30 Hz on the counter.

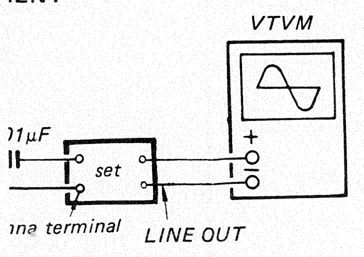
B) Simple Method

Procedure:

1. Tune the set to the FM stereo broadcasting signal.
2. Turn RV3 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
3. Secure RV3 at the center of the lighting-up range of both turns as shown below.


center of lighting-up ranges
lighting-up range

ENT


VTVM
)1μF
set
ına terminal
LINE OUT

kHz deviation

3)

vhen the VTVM indication

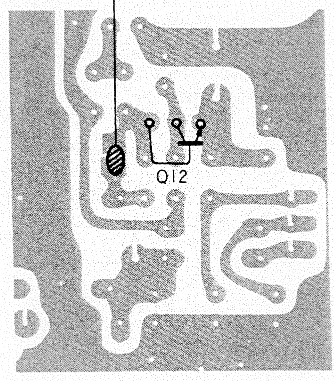
NOISE CANCELLER ADJUSTMENT

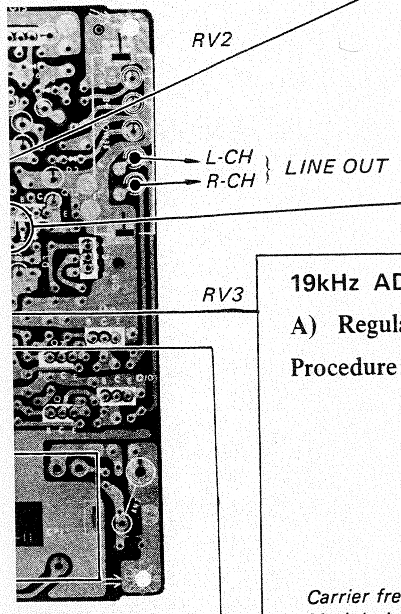
No adjustment is needed.
Set RV2 to the center position when replaced.

B+ ADJUSTMENT

Apply 12V DC to B+ input. Solder or unsolder the pattern so that the emitter voltage at Q12 is 9V.

Adjustment Location

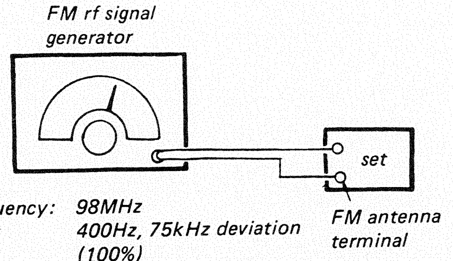



RV2
L-CH
R-CH
LINE OUT
RV3

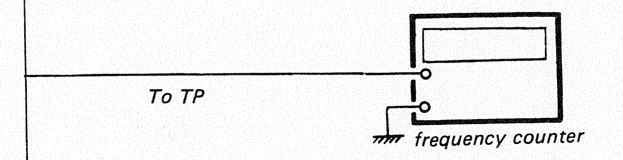
19kHz ADJUSTMENT

A) Regular Method

Procedure:


FM rf signal generator
set
FM antenna terminal

Carrier frequency:	*98MHz*
Modulation:	*400Hz, 75kHz deviation (100%)*
Output level:	*1mV (60dB)*

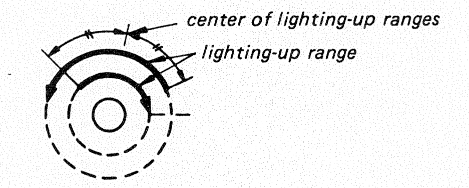

To TP
frequency counter

1. Tune the set to 98 MHz.
2. Adjust RV3 for 19 kHz ± 30 Hz on the counter.

B) Simple Method

Procedure:

1. Tune the set to the FM stereo broadcasting signal.
2. Turn RV3 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
3. Secure RV3 at the center of the lighting-up range of both turns as shown below.


center of lighting-up ranges
lighting-up range

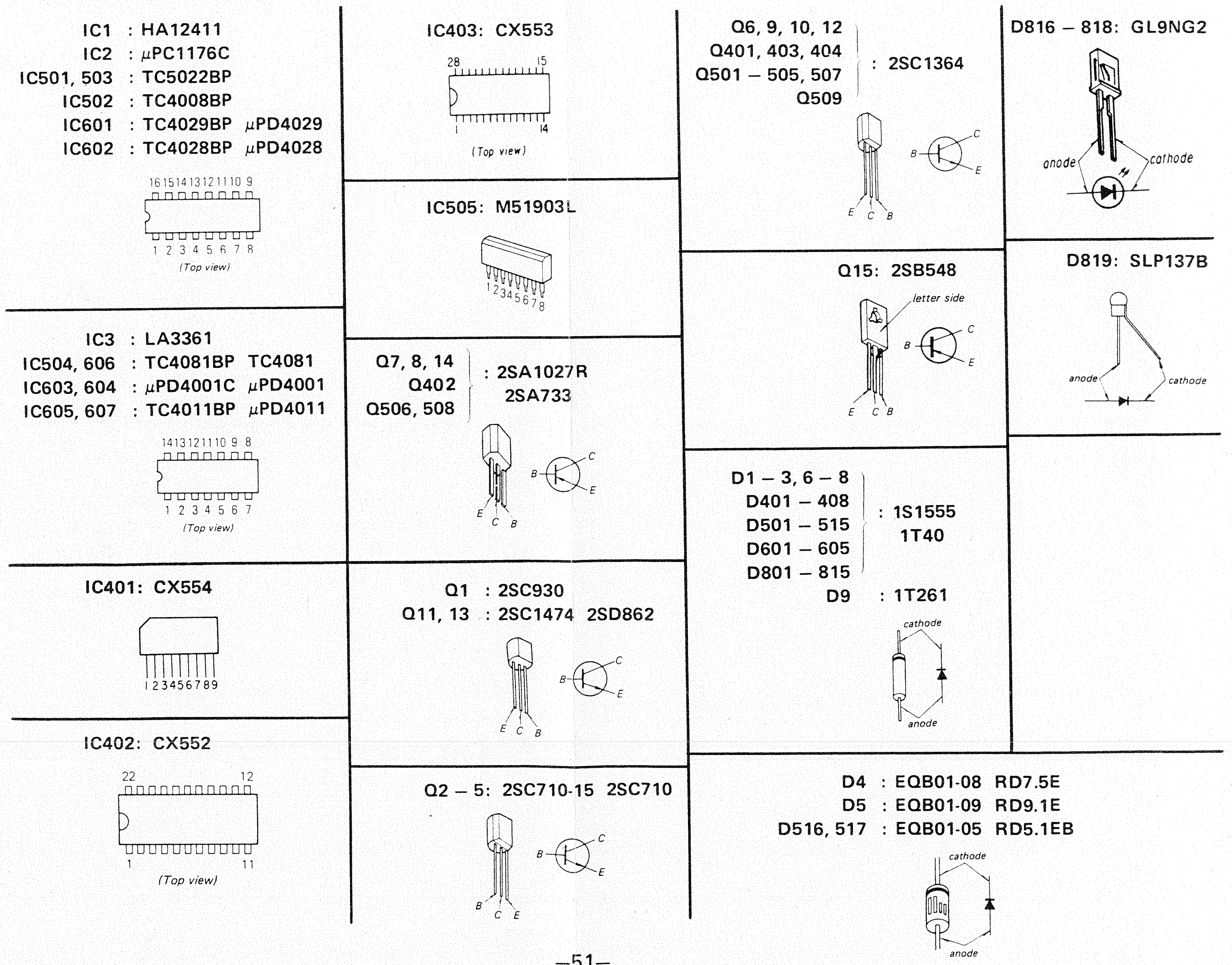
ve.

Note : For schematic diagram

Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- △ : internal component.
- ▭ : adjustment for repair.
- ——— : B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  Received frequency: 76MHz
  MANUAL switch: ON
  MEMORY RESET switch: OFF
- Voltage variations may be noted due to normal production tolerances.

Semiconductor Lead Layouts


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
(Top view)
14 13 12 11 10 9 8
1 2 3 4 5 6 7
(Top view)
123456789
22
12
1
11
(Top view)
28
15
1
14
(Top view)
12345678
B
C
E
letter side
anode
cathode

IC1 : HA12411
IC2 : μPC1176C
IC501, 503 : TC5022BP
IC502 : TC4008BP
IC601 : TC4029BP μPD4029
IC602 : TC4028BP μPD4028

IC3 : LA3361
IC504, 606 : TC4081BP TC4081
IC603, 604 : μPD4001C μPD4001
IC605, 607 : TC4011BP μPD4011

IC401: CX554

IC402: CX552

IC403: CX553

IC505: M51903L

Q7, 8, 14 / Q402 / Q506, 508 : 2SA1027R 2SA733

Q1 : 2SC930
Q11, 13 : 2SC1474 2SD862

Q2 – 5: 2SC710-15 2SC710

Q6, 9, 10, 12 / Q401, 403, 404 / Q501 – 505, 507 / Q509 : 2SC1364

Q15: 2SB548

D1 – 3, 6 – 8 / D401 – 408 / D501 – 515 / D601 – 605 / D801 – 815 : 1S1555 1T40
D9 : 1T261

D816 – 818: GL9NG2

D819: SLP137B

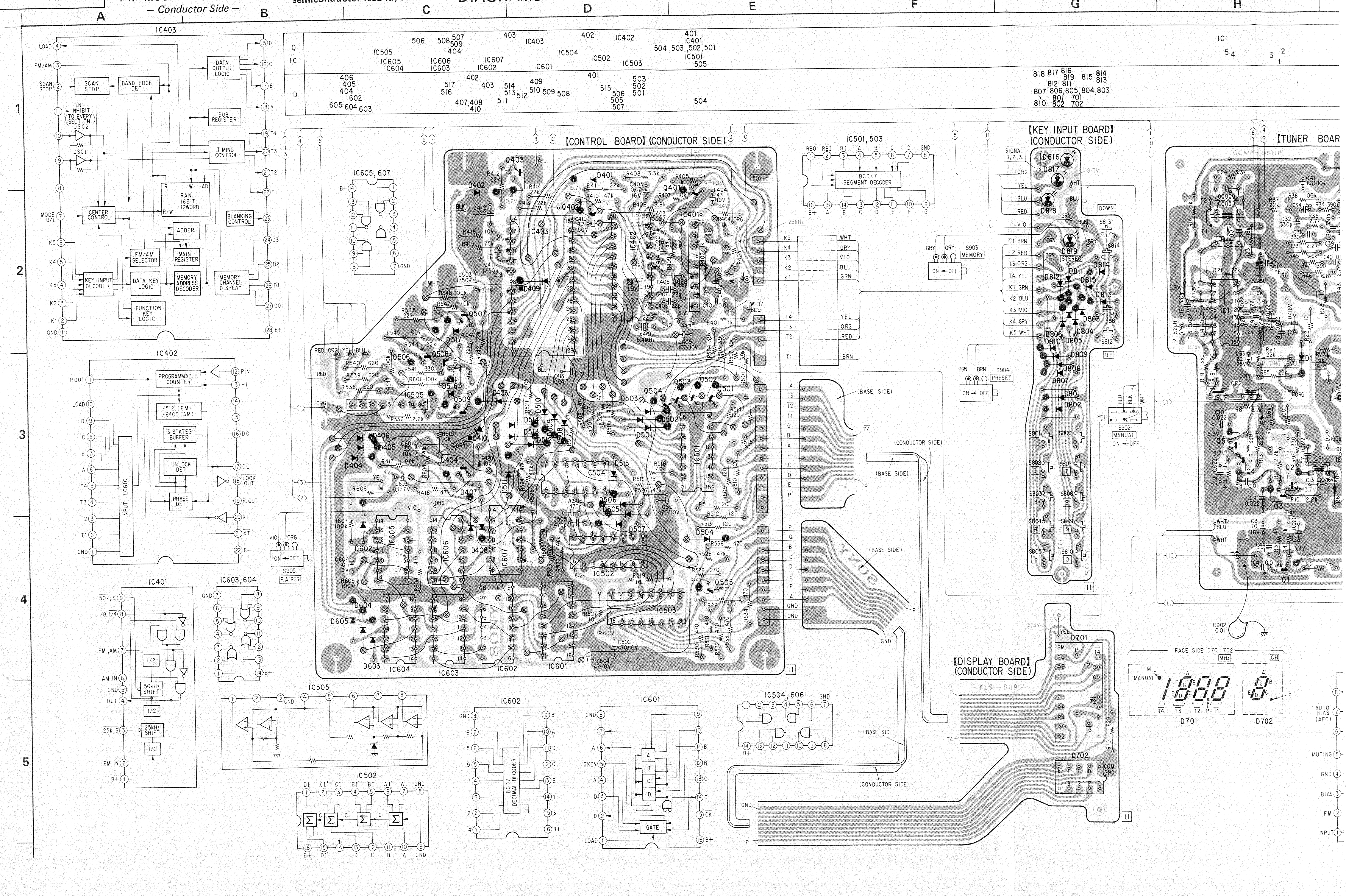
D4 : EQB01-08 RD7.5E
D5 : EQB01-09 RD9.1E
D516, 517 : EQB01-05 RD5.1EB

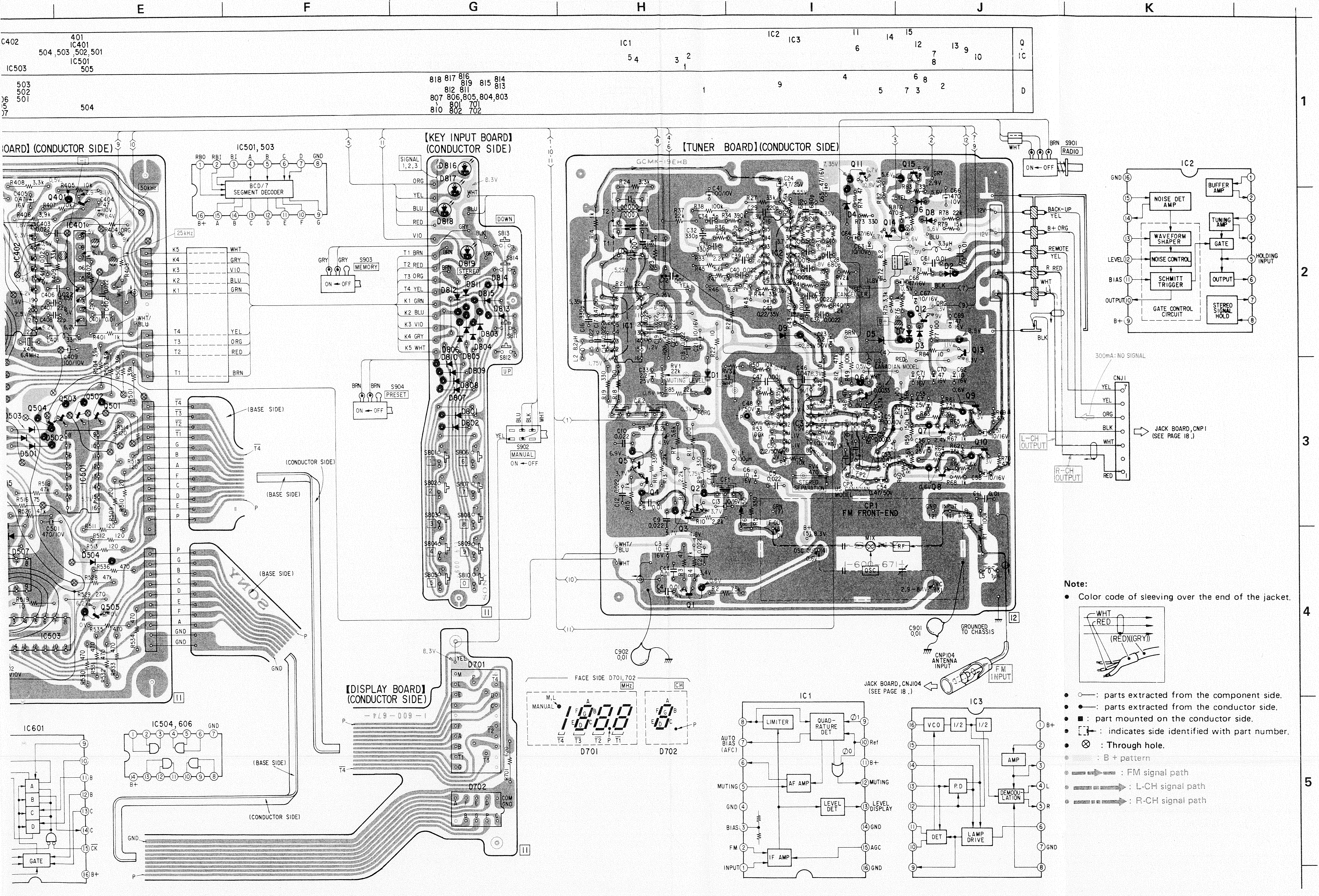
FM TUNER SECTION

SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM
– Conductor Side –

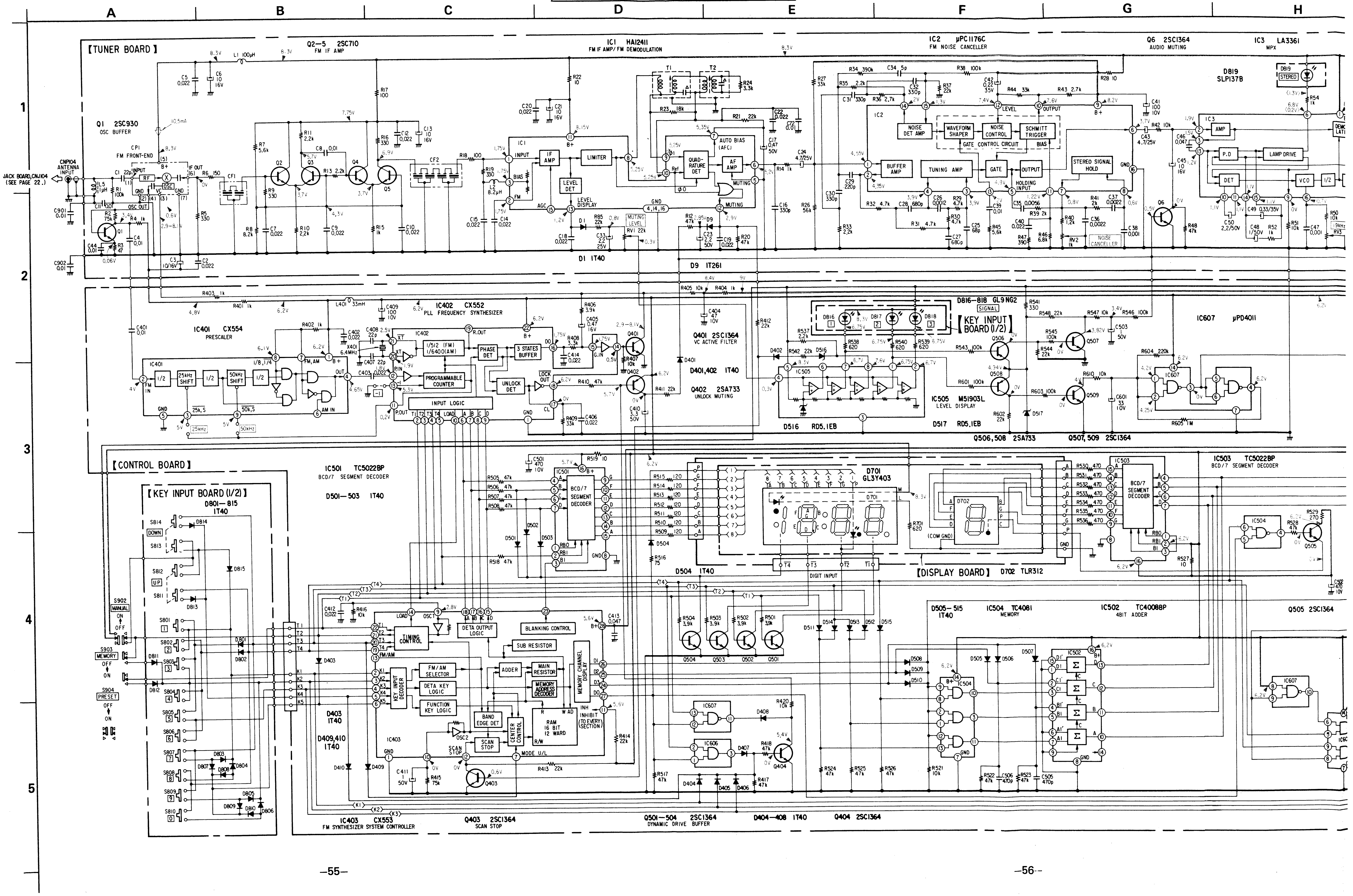
- Refer to page 51 for semiconductor lead layouts.


A
B
C
D
E
F
G
H
1
2
3
4
5
IC403
LOAD
FM/AM
SCAN STOP
INH INHIBIT (TO EVERY SECTION)
OSC2
OSC1
MODE U/L
K5
K4
K3
K2
K1
GND
SCAN STOP
BAND EDGE DET
DATA OUTPUT LOGIC
SUB REGISTER
TIMING CONTROL
RAM 16BIT 12WORD
CENTER CONTROL
BLANKING CONTROL
ADDER
FM/AM SELECTOR
MAIN REGISTER
KEY INPUT DECODER
DATA KEY LOGIC
MEMORY ADDRESS DECODER
MEMORY CHANNEL DISPLAY
FUNCTION KEY LOGIC
IC402
PROGRAMMABLE COUNTER
1/512 (FM) 1/6400 (AM)
3 STATES BUFFER
UNLOCK DET
PHASE DET
INPUT LOGIC
P.OUT
LOCK OUT
R.OUT
XT
B+
IC401
50k, S
1/8, 1/4
FM, AM
AM IN
GND
OUT
25k, S
FM IN
50kHz SHIFT
25kHz SHIFT
1/2
IC603, 604
IC605, 607
IC505
IC602
BCD/DECIMAL DECODER
IC601
GATE
CKEN
IC502
DI
CI'
CI
BI'
BI
AI'
AI
IC504, 606
IC501, 503
BCD/7 SEGMENT DECODER
Q
IC
D
[CONTROL BOARD] (CONDUCTOR SIDE)
[KEY INPUT BOARD] (CONDUCTOR SIDE)
[TUNER BOAR
[DISPLAY BOARD] (CONDUCTOR SIDE)
(BASE SIDE)
(CONDUCTOR SIDE)
S902 MANUAL ON ← OFF
S903 MEMORY
S904 PRESET
S905 P.A.R.S
ON ← OFF
X401 6.4MHz
50kHz
25kHz
SIGNAL 1, 2, 3
STEREO
DOWN
UP
MUTING LEVEL
FACE SIDE D701, 702
MANUAL
MHz
CH
D701
D702
C902 0.01
AUTO BIAS (AFC)
MUTING
GND
BIAS
FM
INPUT
SONY
GCMK-19EHB
1-600-674

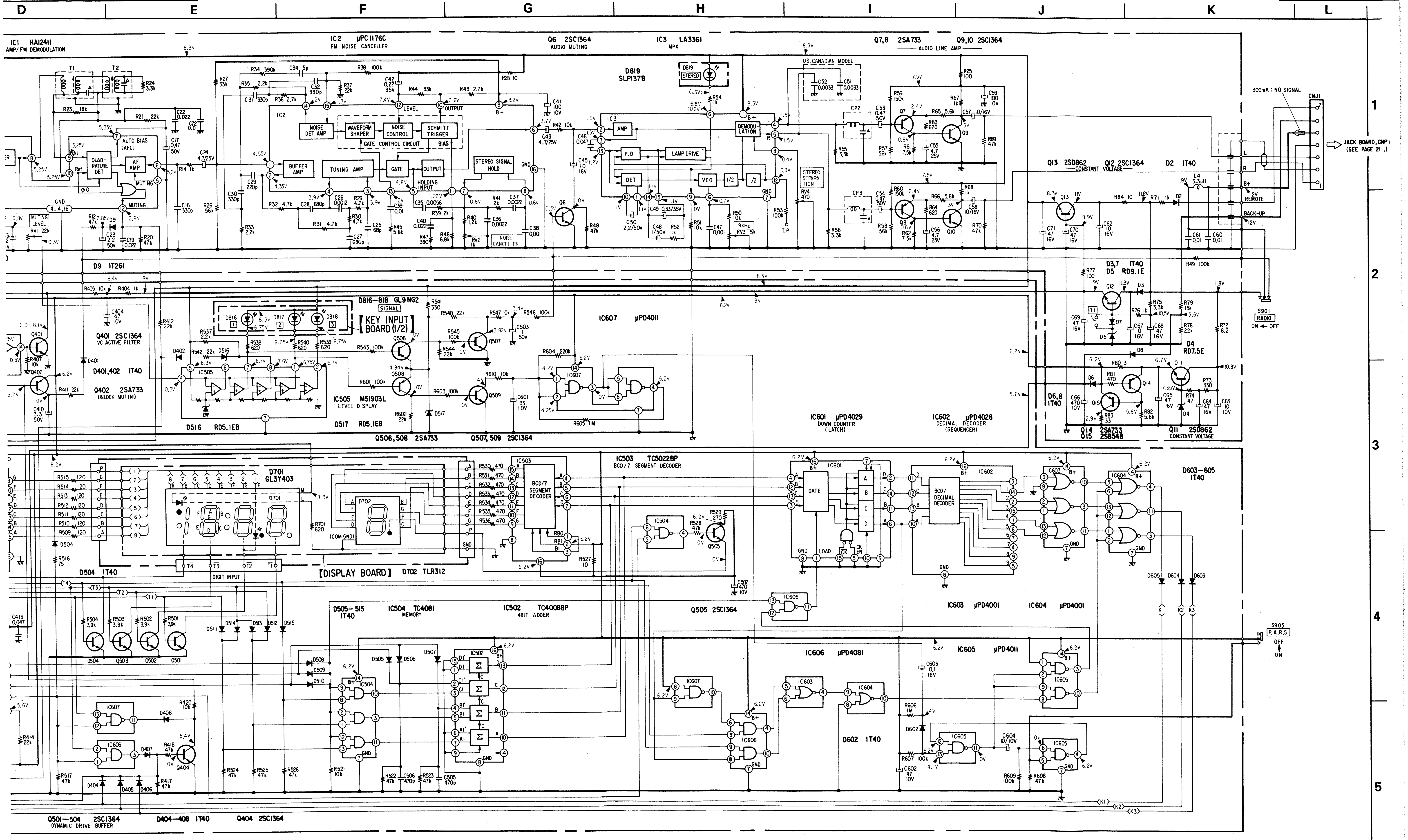

E
F
G
H
I
J
K
1
2
3
4
5
【KEY INPUT BOARD】 (CONDUCTOR SIDE)
【TUNER BOARD】(CONDUCTOR SIDE)
【DISPLAY BOARD】 (CONDUCTOR SIDE)
BOARD】(CONDUCTOR SIDE)
IC501, 503
BCD/7 SEGMENT DECODER
IC2
NOISE DET AMP
WAVEFORM SHAPER
NOISE CONTROL
SCHMITT TRIGGER
GATE CONTROL CIRCUIT
BUFFER AMP
TUNING AMP
GATE
OUTPUT
STEREO SIGNAL HOLD
HOLDING INPUT
LEVEL
BIAS
B+
IC1
LIMITER
QUAD-RATURE DET
AF AMP
LEVEL DET
IF AMP
AUTO BIAS (AFC)
MUTING
GND
FM
INPUT
Ref
LEVEL DISPLAY
AGC
IC3
VCO
1/2
AMP
P.D
DEMODU-LATION
DET
LAMP DRIVE
IC601
GATE
IC504, 606
CP1 FM FRONT-END
MIX
RF
OSC
S901 RADIO
S902 MANUAL
S903 MEMORY
S904 PRESET
ON ← OFF
BACK-UP YEL
B+ ORG
REMOTE YEL
R RED
CNJ1
JACK BOARD, CNP1 (SEE PAGE 18.)
JACK BOARD, CNJ104 (SEE PAGE 18.)
CNP104 ANTENNA INPUT
FM INPUT
GROUNDED TO CHASSIS
C901 0.01
C902 0.01
L-CH OUTPUT
R-CH OUTPUT
300mA: NO SIGNAL
FACE SIDE D701, 702
MHz
CH
MANUAL
D701
D702
(BASE SIDE)
(CONDUCTOR SIDE)
STEREO SEPARATION
NOISE CANCELLER
MUTING LEVEL
CANADIAN MODEL
US, CANADIAN MODEL
WHT
RED
(RED)((GRY))

Note:

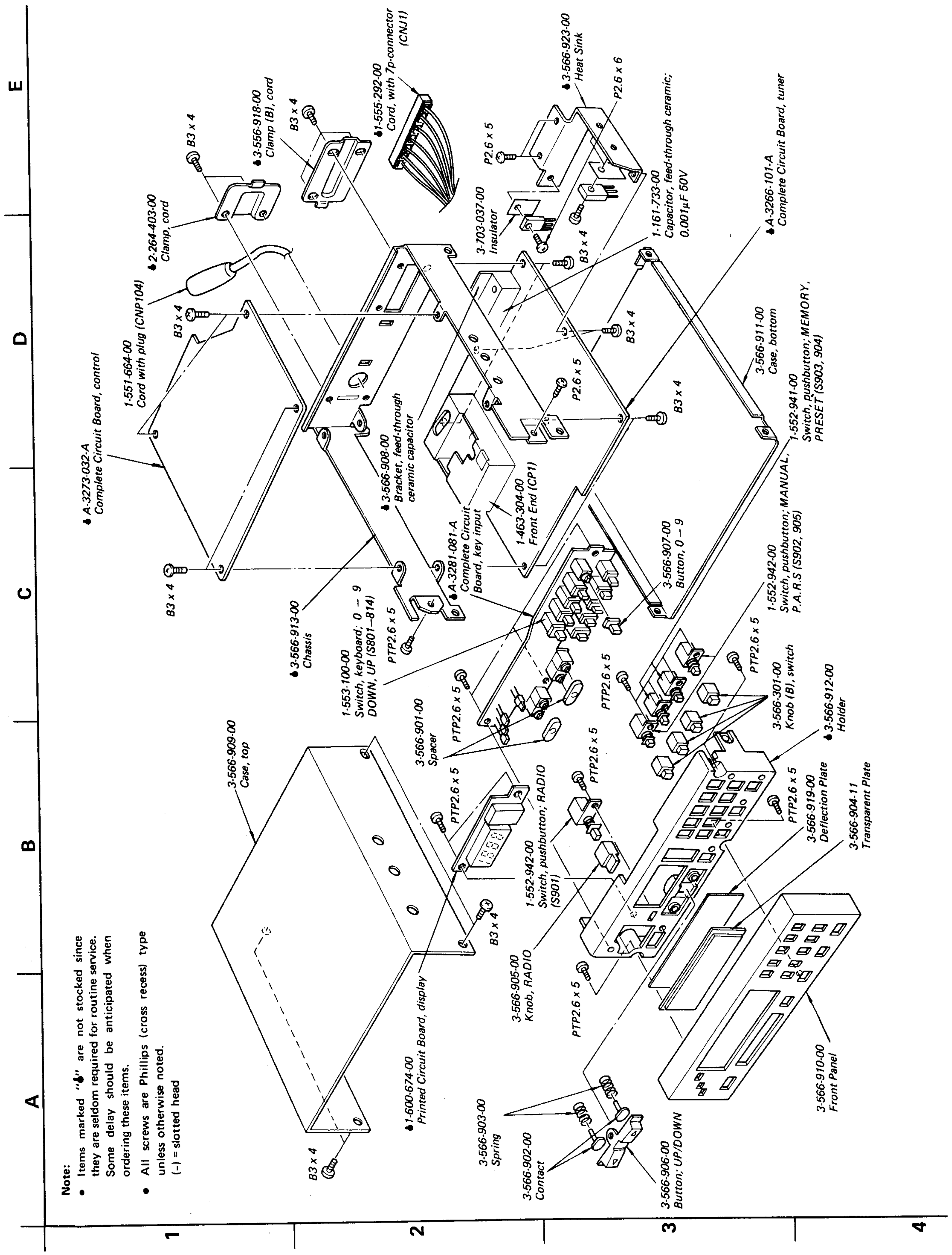
- Color code of sleeving over the end of the jacket.
- ○―: parts extracted from the component side.
- ●―: parts extracted from the conductor side.
- ■ : part mounted on the conductor side.
- [ ]← : indicates side identified with part number.
- ⊗ : Through hole.
- ▨ : B + pattern
- ➡ : FM signal path
- ➡ : L-CH signal path
- ➡ : R-CH signal path



[TUNER BOARD]
Q1 2SC930 OSC BUFFER
CP1 FM FRONT-END
Q2-5 2SC710 FM IF AMP
IC1 HA12411 FM IF AMP/FM DEMODULATION
IC2 μPC1176C FM NOISE CANCELLER
Q6 2SC1364 AUDIO MUTING
IC3 LA3361 MPX
D819 SLP137B
STEREO
JACK BOARD,CNJ104 (SEE PAGE 22.)
CNP104 ANTENNA INPUT
IF AMP
LIMITER
LEVEL DET
QUADRATURE DET
AUTO BIAS (AFC)
AF AMP
MUTING
LEVEL DISPLAY
MUTING LEVEL RV1 22k
D1 1T40
D9 1T261
NOISE DET AMP
WAVEFORM SHAPER
NOISE CONTROL
SCHMITT TRIGGER
GATE CONTROL CIRCUIT
BIAS
BUFFER AMP
TUNING AMP
GATE
OUTPUT
HOLDING INPUT
STEREO SIGNAL HOLD
NOISE CANCELLER
AMP
P.D
LAMP DRIVE
DET
VCO
IC401 CX554 PRESCALER
IC402 CX552 PLL FREQUENCY SYNTHESIZER
PHASE DET
3 STATES BUFFER
PROGRAMMABLE COUNTER
UNLOCK DET
INPUT LOGIC
Q401 2SC1364 VC ACTIVE FILTER
D401,402 1T40
Q402 2SA733 UNLOCK MUTING
D816-818 GL9NG2
SIGNAL
[KEY INPUT BOARD (1/2)]
IC505 M51903L LEVEL DISPLAY
D516 RD5.1EB
D517 RD5.1EB
Q506,508 2SA733
Q507,509 2SC1364
IC607 μPD4011
[CONTROL BOARD]
[KEY INPUT BOARD (1/2)]
D801-815 1T40
S814 DOWN
S813
S812 UP
S811
S902 MANUAL ON OFF
S903 MEMORY OFF ON
S904 PRESET OFF ON
IC501 TC5022BP BCD/7 SEGMENT DECODER
D501-503 1T40
BCD/7 SEGMENT DECODER
D701 GL3Y403
D702 TLR312
[DISPLAY BOARD]
DIGIT INPUT
D504 1T40
IC503 TC5022BP BCD/7 SEGMENT DECODER
TIMING CONTROL
DETA OUTPUT LOGIC
BLANKING CONTROL
SUB RESISTOR
KEY INPUT DECODER
FM/AM SELECTOR
DETA KEY LOGIC
FUNCTION KEY LOGIC
ADDER
MAIN RESISTOR
MEMORY ADDRESS DECODER
MEMORY CHANNEL DISPLAY
BAND EDGE DET
SCAN STOP
CENTER CONTROL
RAM 16 BIT 12 WARD
INHIBIT (TO EVERY SECTION)
MODE U/L
D403 1T40
D409,410 1T40
IC403 CX553 FM SYNTHESIZER SYSTEM CONTROLLER
Q403 2SC1364 SCAN STOP
Q501-504 2SC1364 DYNAMIC DRIVE BUFFER
D404-408 1T40
Q404 2SC1364
D505-515 1T40
IC504 TC4081 MEMORY
IC502 TC4008BP 4BIT ADDER
Q505 2SC1364
IC606
IC607
A B C D E F G H
1 2 3 4 5


D
E
F
G
H
I
J
K
L
1
2
3
4
5
IC1 HA12411
AMP/FM DEMODULATION
IC2 μPC1176C
FM NOISE CANCELLER
Q6 2SC1364
AUDIO MUTING
IC3 LA3361
MPX
Q7,8 2SA733
Q9,10 2SC1364
AUDIO LINE AMP
D819
SLP137B
STEREO
U.S.,CANADIAN MODEL
NOISE DET AMP
WAVEFORM SHAPER
NOISE CONTROL
SCHMITT TRIGGER
GATE CONTROL CIRCUIT
BIAS
LEVEL
OUTPUT
BUFFER AMP
TUNING AMP
GATE
HOLDING INPUT
STEREO SIGNAL HOLD
NOISE CANCELLER
QUAD-RATURE DET
AF AMP
AUTO BIAS (AFC)
MUTING
MUTING LEVEL
AMP
P.D
LAMP DRIVE
DET
VCO
1/2
DEMODU-LATION
STEREO SEPARA-TION
19kHz
T.P
300mA : NO SIGNAL
CNJ1
JACK BOARD,CNP1 (SEE PAGE 21 .)
REMOTE
BACK-UP
Q13 2SD862
Q12 2SC1364
CONSTANT VOLTAGE
D2 1T40
D3,7 1T40
D5 RD9.1E
D4 RD7.5E
D6,8 1T40
Q14 2SA733
Q15 2SB548
Q11 2SD862
CONSTANT VOLTAGE
S901
RADIO
ON ← OFF
D9 1T261
Q401 2SC1364
VC ACTIVE FILTER
D401,402 1T40
Q402 2SA733
UNLOCK MUTING
D816-818 GL9NG2
SIGNAL
KEY INPUT BOARD (1/2)
IC505 M51903L
LEVEL DISPLAY
D516 RD5.1EB
D517 RD5.1EB
Q506,508 2SA733
Q507,509 2SC1364
IC607 μPD4011
D701
GL3Y403
D702
(COM GND)
DISPLAY BOARD
D702 TLR312
D504 1T40
DIGIT INPUT
IC503 TC5022BP
BCD/7 SEGMENT DECODER
BCD/7 SEGMENT DECODER
IC601 μPD4029
DOWN COUNTER (LATCH)
IC602 μPD4028
DECIMAL DECODER (SEQUENCER)
GATE
LOAD
BCD/ DECIMAL DECODER
D603-605
1T40
IC603 μPD4001
IC604 μPD4001
S905
P.A.R.S.
OFF
ON
D505-515
1T40
IC504 TC4081
MEMORY
IC502 TC4008BP
4BIT ADDER
Q505 2SC1364
IC606 μPD4081
IC605 μPD4011
D602 1T40
Q501-504 2SC1364
DYNAMIC DRIVE BUFFER
D404-408 1T40
Q404 2SC1364

SECTION 5
EXPLODED VIEW


E
D
C
B
A
1
2
3
4
♦1-555-292-00 Cord, with 7p-connector (CNJ1)
♦3-566-923-00 Heat Sink
P2.6 x 6
P2.6 x 5
♦3-556-918-00 Clamp (B), cord
B3 x 4
♦2-264-403-00 Clamp, cord
3-703-037-00 Insulator
1-161-733-00 Capacitor, feed-through ceramic; 0.001μF 50V
♦A-3266-101-A Complete Circuit Board, tuner
1-551-664-00 Cord with plug (CNP104)
♦A-3273-032-A Complete Circuit Board, control
♦3-566-908-00 Bracket, feed-through ceramic capacitor
1-463-304-00 Front End (CP1)
3-566-911-00 Case, bottom
1-552-941-00 Switch, pushbutton; MEMORY, PRESET (S903, 904)
♦A-3281-081-A Complete Circuit Board, key input
3-566-907-00 Button, 0 – 9
1-552-942-00 Switch, pushbutton; MANUAL, P.A.R.S (S902, 905)
♦3-566-913-00 Chassis
1-553-100-00 Switch, keyboard; 0 – 9 DOWN, UP (S801–814)
PTP2.6 x 5
3-566-901-00 Spacer
3-566-301-00 Knob (B), switch
♦3-566-912-00 Holder
3-566-909-00 Case, top
1-552-942-00 Switch, pushbutton; RADIO (S901)
3-566-919-00 Deflection Plate
3-566-904-11 Transparent Plate
3-566-905-00 Knob, RADIO
♦1-600-674-00 Printed Circuit Board, display
3-566-910-00 Front Panel
3-566-903-00 Spring
3-566-902-00 Contact
3-566-906-00 Button; UP/DOWN

Note:
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All screws are Phillips (cross recess) type unless otherwise noted. (-) = slotted head

---

SECTION 6
ELECTRICAL PARTS LIST

SEMICONDUCTORS

Transistors

Ref. No.	Part No.	Description
Q1	8-729-803-04	2SC930
Q2–5	8-729-671-15	2SC710-15
Q6	8-729-663-47	2SC1364
Q7, 8	8-729-612-77	2SA1027R
Q9, 10	8-729-663-47	2SC1364
Q11	8-760-335-10	2SC1474
Q12	8-729-663-47	2SC1364
Q13	8-760-335-10	2SC1474
Q14	8-729-612-77	2SA1027R
Q15	8-729-154-83	2SB548
Q401	8-729-663-47	2SC1364
Q402	8-729-612-77	2SA1027R
Q403, 404	8-729-663-47	2SC1364
Q501–505	8-729-663-47	2SC1364
Q506	8-729-612-77	2SA1027R
Q507	8-729-663-47	2SC1364
Q508	8-729-612-77	2SA1027R
Q509	8-729-663-47	2SC1364

ICs

Ref. No.	Part No.	Description
IC1	8-759-324-11	HA12411
IC2	8-759-111-76	μPC1176C
IC3	8-759-833-61	LA3361
IC401	8-759-205-54	CX554
IC402	8-759-205-52	CX552
IC403	8-759-205-53	CX553
IC501	8-759-250-22	TC5022BP
IC502	8-759-240-08	TC4008BP
IC503	8-759-250-22	TC5022BP
IC504	8-759-240-81	TC4081BP
IC505	8-759-619-03	M51903L
IC601	8-759-240-29	TC4029BP
IC602	8-759-240-28	TC4028BP
IC603, 604	8-759-140-01	μPD4001C
IC605	8-759-240-11	TC4011BP
IC606	8-759-240-81	TC4081BP
IC607	8-759-240-11	TC4011BP

Diodes

Ref. No.	Part No.	Description
D1–3	8-719-815-55	1S1555
D4	8-719-931-08	EQB01-08
D5	8-719-931-09	EQB01-09
D6–8	8-719-815-55	1S1555
D9	8-719-026-11	1T261
D401–410 D501–515	8-719-815-55	1S1555
D516, 517	8-719-931-05	EQB01-05
D602–605	8-719-815-55	1S1555
D701	8-719-934-03	GL3Y403
D702	8-719-803-12	TLR312
D801–815	8-719-815-55	1S1555
D816–818	8-719-909-20	GL9NG2
D819	8-719-901-37	SLP137B

CAPACITORS

Common capacitors are omitted. Refer to the lists 88 and 89 for their part numbers. pF : μμF

Ref. No.	Part No.	Value	Voltage	Type
	1-161-733-00	0.001μF	50V	ceramic (feed-through)
C29	1-161-315-00	220pF	50V	ceramic
C47	1-130-018-00	0.001μF	50V	polyethylene

RESISTORS

Common resistors are omitted. Refer to the list on the last page for their part numbers.

Ref. No.	Part No.	Description
RV1	1-226-237-00	22kΩ, adjustable; muting level
RV2	1-226-234-00	1kΩ, adjustable; noise canceller
RV3	1-226-235-00	5kΩ, adjustable; 19kHz
RV4	1-226-232-00	500Ω, adjustable; stereo separation

MISCELLANEOUS

Ref. No.	Part No.	Description
CF1	1-527-535-00	Ceramic Filter, 10.7MHz
CF2	1-527-277-91	Solid State Filter, 10.7MHz

Note:
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Re
CN
CN
CP1
CP
L1
L2
L3
L4
L5
L4
S8
S9
S9
S9
T1
T2
X4

SECTION 6
ELECTRICAL PARTS LIST

SEMICONDUCTORS

Transistors

Ref. No.	*Part No.*	*Description*
Q1	8-729-803-04	2SC930
Q2–5	8-729-671-15	2SC710-15
Q6	8-729-663-47	2SC1364
Q7, 8	8-729-612-77	2SA1027R
Q9, 10	8-729-663-47	2SC1364
Q11	8-760-335-10	2SC1474
Q12	8-729-663-47	2SC1364
Q13	8-760-335-10	2SC1474
Q14	8-729-612-77	2SA1027R
Q15	8-729-154-83	2SB548
Q401	8-729-663-47	2SC1364
Q402	8-729-612-77	2SA1027R
Q403, 404	8-729-663-47	2SC1364
Q501–505	8-729-663-47	2SC1364
Q506	8-729-612-77	2SA1027R
Q507	8-729-663-47	2SC1364
Q508	8-729-612-77	2SA1027R
Q509	8-729-663-47	2SC1364

ICs

Ref. No.	*Part No.*	*Description*
IC1	8-759-324-11	HA12411
IC2	8-759-111-76	μPC1176C
IC3	8-759-833-61	LA3361
IC401	8-759-205-54	CX554
IC402	8-759-205-52	CX552
IC403	8-759-205-53	CX553
IC501	8-759-250-22	TC5022BP
IC502	8-759-240-08	TC4008BP
IC503	8-759-250-22	TC5022BP
IC504	8-759-240-81	TC4081BP
IC505	8-759-619-03	M51903L
IC601	8-759-240-29	TC4029BP
IC602	8-759-240-28	TC4028BP
IC603, 604	8-759-140-01	μPD4001C
IC605	8-759-240-11	TC4011BP
IC606	8-759-240-81	TC4081BP
IC607	8-759-240-11	TC4011BP

Diodes

Ref. No.	*Part No.*	*Description*
D1–3	8-719-815-55	1S1555
D4	8-719-931-08	EQB01-08
D5	8-719-931-09	EQB01-09
D6–8	8-719-815-55	1S1555
D9	8-719-026-11	1T261
D401–410 D501–515	8-719-815-55	1S1555
D516, 517	8-719-931-05	EQB01-05
D602–605	8-719-815-55	1S1555
D701	8-719-934-03	GL3Y403
D702	8-719-803-12	TLR312
D801–815	8-719-815-55	1S1555
D816–818	8-719-909-20	GL9NG2
D819	8-719-901-37	SLP137B

CAPACITORS

Common capacitors are omitted. Refer to the lists 88 and 89 for their part numbers. pF : μμF

Ref. No.	*Part No.*	*Description*		
	1-161-733-00	0.001μF	50V	ceramic (feed-through)
C29	1-161-315-00	220pF	50V	ceramic
C47	1-130-018-00	0.001μF	50V	polyethylene

RESISTORS

Common resistors are omitted. Refer to the list on the last page for their part numbers.

Ref. No.	*Part No.*	*Description*
RV1	1-226-237-00	22kΩ, adjustable; muting level
RV2	1-226-234-00	1kΩ, adjustable; noise canceller
RV3	1-226-235-00	5kΩ, adjustable; 19kHz
RV4	1-226-232-00	500Ω, adjustable; stereo separation

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
CF1	1-527-535-00	Ceramic Filter, 10.7MHz
CF2	1-527-277-91	Solid State Filter, 10.7MHz

Note:

- Items marked "♠" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Ref. No.	*Part No.*	*Description*
CNJ1	♠1-555-292-00	Cord, with 7p-connector
CNP104	1-551-664-00	Cord, with plug
CP1	1-463-304-00	Front End
CP2, 3	1-231-224-00	Encapsulated Component
L1	1-408-195-00	Microinductor, 100μH
L2	1-408-182-00	Microinductor, 8.2μH
L3	1-407-741-00	Microinductor, 18μH
L4	1-407-484-00	Microinductor, 3.3μH
L5	1-408-171-00	Microinductor, 1μH
L401	1-407-163-XX	Microinductor, 33mH
S801–814	1-552-100-00	Switch, keyboard; 0–9, DOWN, UP
S901, 902	1-552-942-00	Switch, pushbutton; RADIO, MANUAL
S903, 904	1-552-941-00	Switch, pushbutton; MEMORY, PRESET
S905	1-552-942-00	Switch, pushbutton; P.A.R.S.
T1	1-404-246-00	Transformer, discriminator
T2	1-404-247-00	Transformer, discriminator
X401	1-527-398-00	Crystal

COMPLETE CIRCUIT BOARDS

♠A-3266-101-A	Tuner
♠A-3273-032-A	Control
♠A-3281-081-A	Key Input

PRINTED CIRCUIT BOARD

♠1-600-674-00	Display

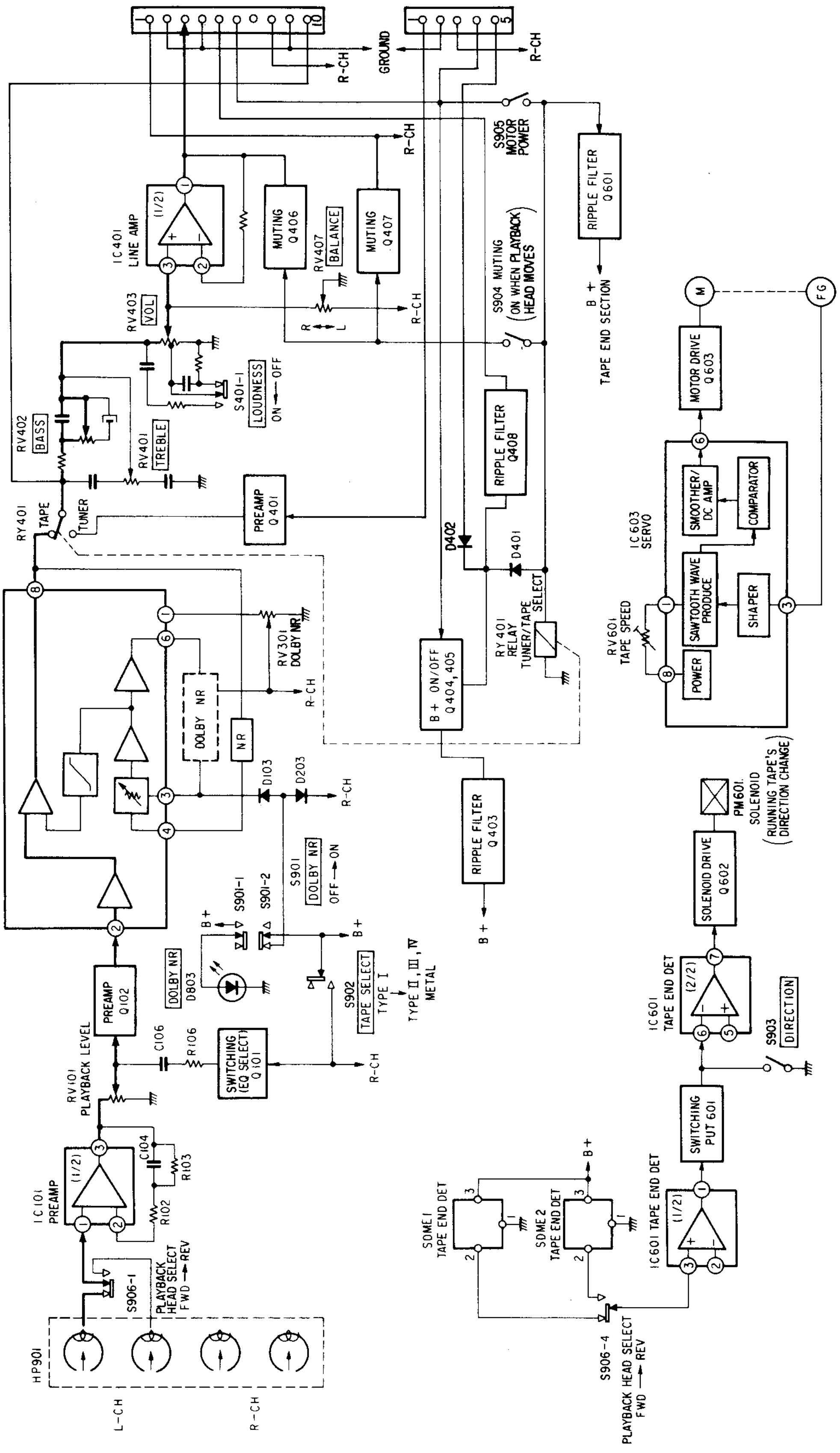
CASSETTE PLAYER SECTION

MEMO

SECTION 1

OUTLINE

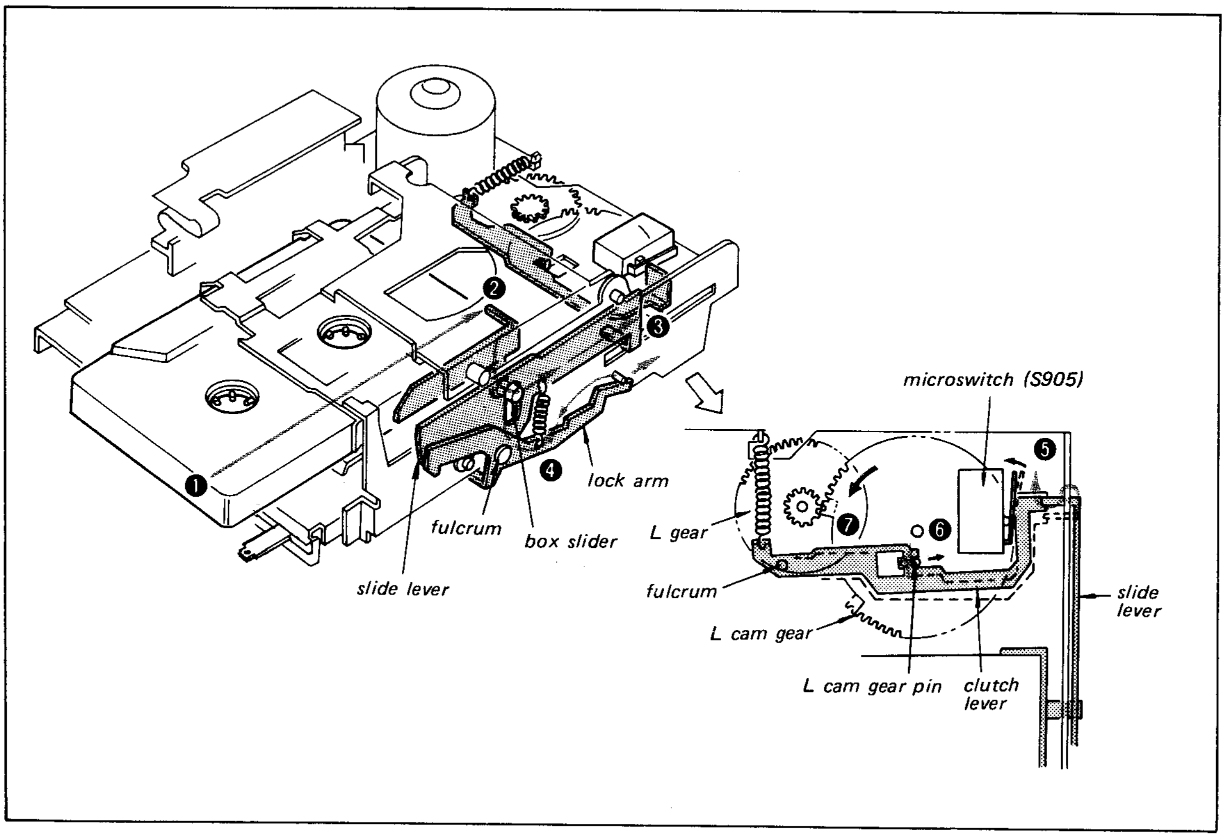
1-1. BLOCK DIAGRAM


HP901
L-CH
R-CH
S906-1
PLAYBACK HEAD SELECT FWD → REV
IC101 PREAMP
(1/2)
C104
R103
R102
RV101 PLAYBACK LEVEL
C106
R106
SWITCHING (EQ SELECT) Q101
PREAMP Q102
IC102 DOLBY/LINE AMP
DOLBY NR
NR
D103
D203
R-CH
RV301 DOLBY NR
S901-1
S901-2
S901 DOLBY NR
OFF → ON
B+
D803
DOLBY NR
S902 TAPE SELECT
TYPE I
TYPE II, III, IV METAL
RY401
TAPE
TUNER
PREAMP Q401
RV402 BASS
RV401 TREBLE
RV403 VOL
S401-1 LOUDNESS
ON ← OFF
IC401 LINE AMP
(1/2)
MUTING Q406
RV407 BALANCE
R ← → L
MUTING Q407
R-CH
GROUND
S905 MOTOR POWER
S904 MUTING (ON WHEN PLAYBACK HEAD MOVES)
RIPPLE FILTER Q601
B+ TAPE END SECTION
RIPPLE FILTER Q408
D402
D401
RY401 RELAY TUNER/TAPE SELECT
B+ ON/OFF Q404, 405
RIPPLE FILTER Q403
B+
M
FG
MOTOR DRIVE Q603
IC603 SERVO
SMOOTHER/ DC AMP
COMPARATOR
SAWTOOTH WAVE PRODUCE
SHAPER
POWER
RV601 TAPE SPEED
PM601 SOLENOID (RUNNING TAPE'S DIRECTION CHANGE)
SOLENOID DRIVE Q602
IC601 TAPE END DET
(2/2)
S903 DIRECTION
SWITCHING PUT 601
IC601 TAPE END DET
(1/2)
SDME1 TAPE END DET
SDME2 TAPE END DET
S906-4 PLAYBACK HEAD SELECT FWD → REV

1-2. MECHANICAL OPERATION

Power Auto Loading Mechanism

Once the cassette tape has been lightly pressed into the cassette compartment, tape loading will proceed automatically.


❷
❸
❶
❹
lock arm
fulcrum
box slider
slide lever
microswitch (S905)
❺
❼
❻
L gear
fulcrum
L cam gear
slide lever
L cam gear pin
clutch lever

❶ Insert the cassette tape.

❷ Box slider is pushed back.

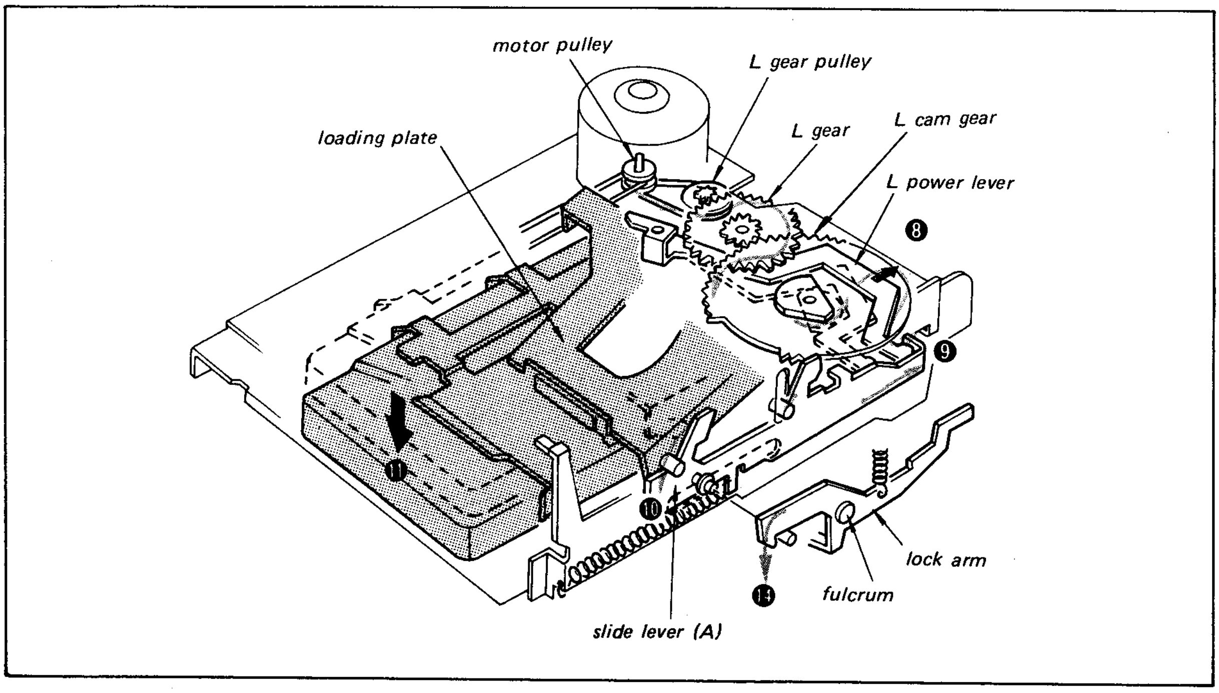
❸ Slide lever moves.

❹ Slide lever is locked.

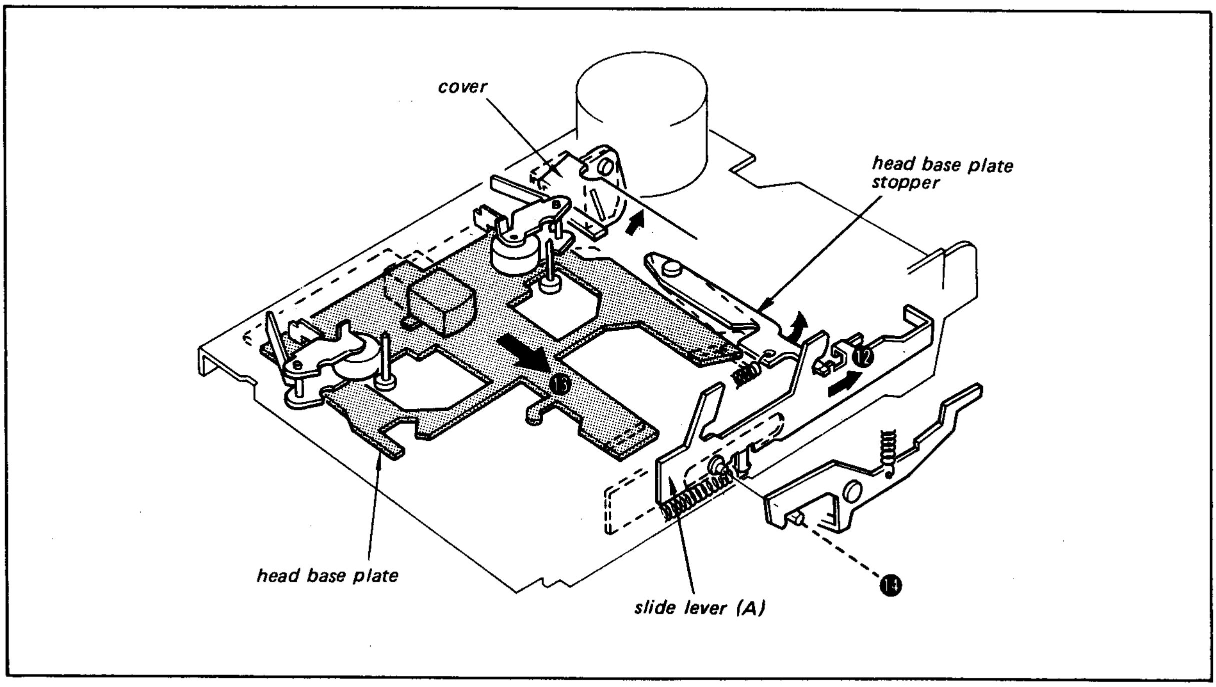
❺ Clutch lever is pushed back, and microswitch (S905: power switch) is turned on. Motor subsequently starts to rotate.

❻ Stopper above L cam gear pin is dislodged by clutch lever movement.

❼ L cam gear engages L gear to start the L gear turning.


motor pulley
L gear pulley
loading plate
L gear
L cam gear
L power lever
⑧
⑨
⑪
⑩
lock arm
⑭
fulcrum
slide lever (A)

⑧ L power lever is forced back when L cam gear rotates once.
⑨ Slide lever (A) is pulled back.
⑩ Loading plate is lowered.
⑪ Cassette tape drops into loaded position.

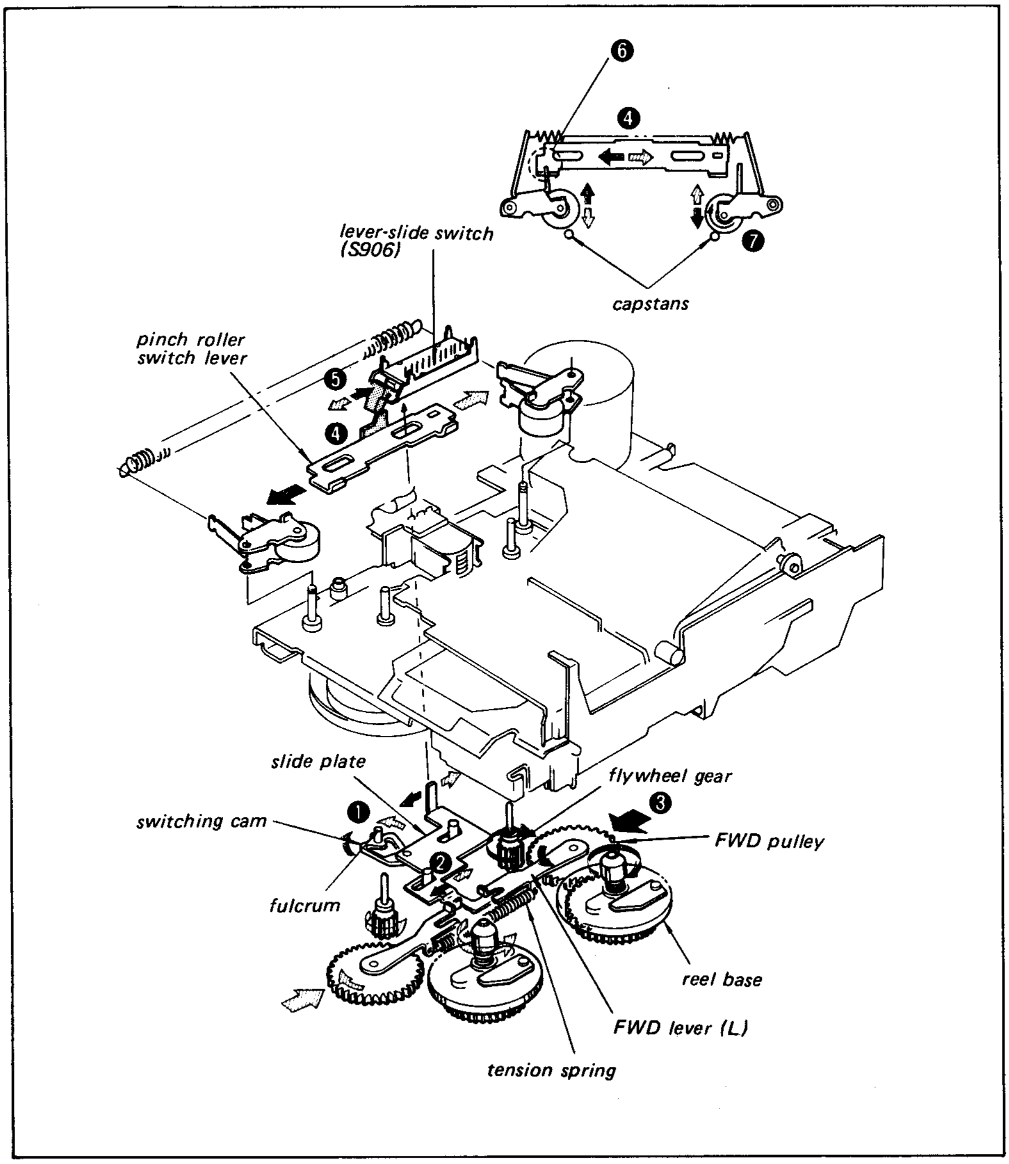

cover
head base plate stopper
⑫
⑬
head base plate
slide lever (A)
⑭

⑫ Head base plate stopper is dislodged.
⑬ Head base plate moves forward.
⑭ Slide lever (A) is locked.

Auto Reverse Mechanism

A) Forward and Reverse Mode Operations

⇦ FWD mode
⬅ Reverse mode


⑥
④
lever-slide switch (S906)
⑦
capstans
pinch roller switch lever
⑤
④
slide plate
flywheel gear
③
switching cam
①
FWD pulley
②
fulcrum
reel base
FWD lever (L)
tension spring

① Switching cam is moved. (See section B on the next page for further information.)

② Slide plate shifted by switching cam movement.

③ Once the slide plate stopper has been removed, the tension spring forces the flywheel gear to engage the FWD pulley and reel base to start the pulley and reel base turning.

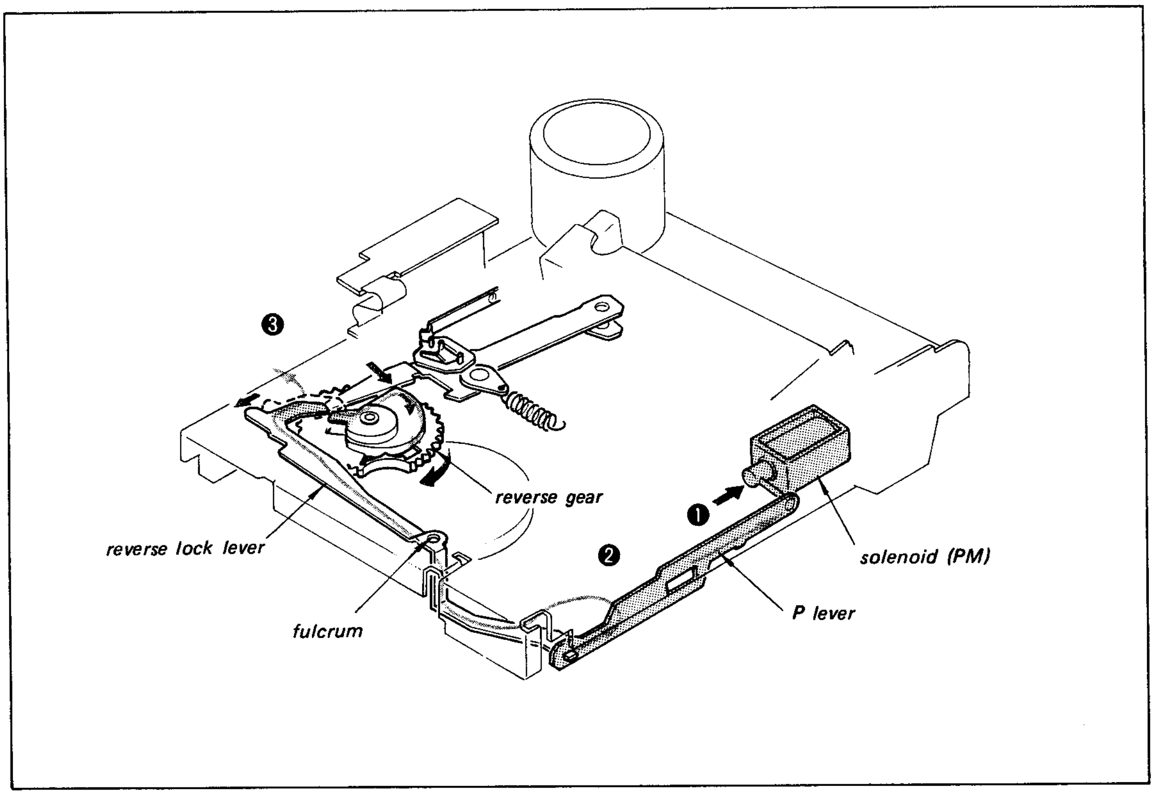
④ The pinch roller switch lever is shifted by the slide plate.

⑤ The lever-slide switch (S906) is switched according to the direction of tape transport. The playback head is also switched.

⑥ When the head base plate moves forward (refer to section C, page 69.), the pinch roller is held by the pinch roller switch lever.

⑦ The other pinch roller rotates.

B) FWD/REV Switching Cam Operation

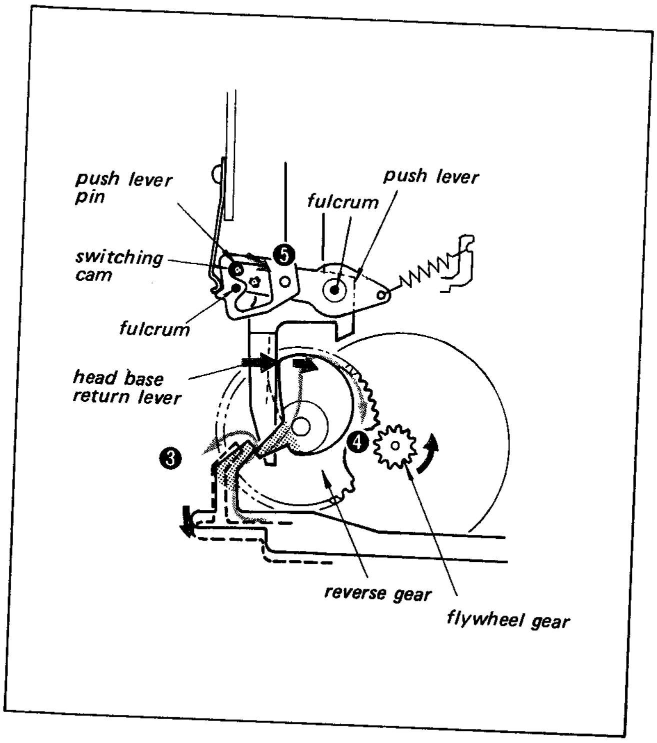

❸
reverse gear
❶
❷
reverse lock lever
solenoid (PM)
fulcrum
P lever

❶ The solenoid is activated temporarily when the tape end is detected, or when the DIRECTION switch (S903) is pressed.

❷ P lever is pulled back.

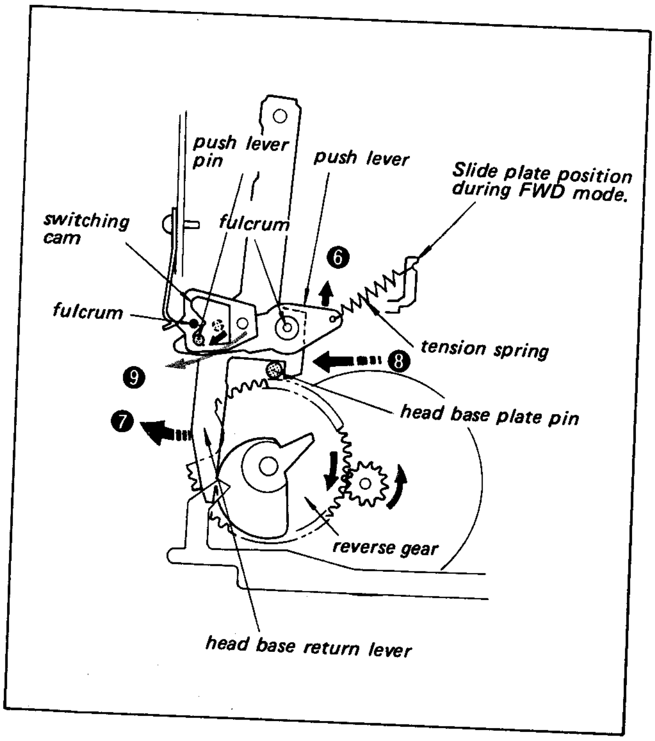
❸ The catch claw of the reverse lock lever is released. (Continued on next page.)

- FWD ➡ REV


push lever pin
push lever
fulcrum
switching cam
⑤
fulcrum
head base return lever
③
④
reverse gear
flywheel gear

④ Reverse gear engages flywheel gear, and begins to rotate.

⑤ Once the reverse gear begins to rotate, the head base return lever moves back in the direction shown by the arrow, and the push lever pin returns to the center position.


push lever pin
push lever
Slide plate position during FWD mode.
switching cam
fulcrum
fulcrum
⑥
tension spring
⑧
⑨
⑦
head base plate pin
reverse gear
head base return lever

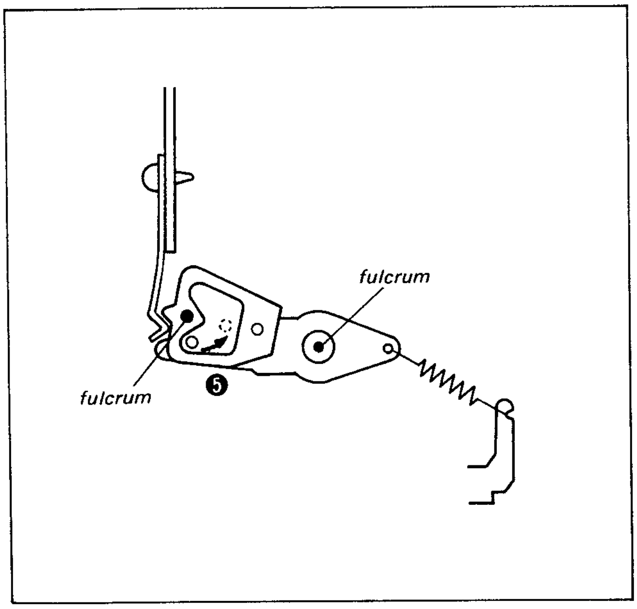
⑥ Push lever is pulled by the tension spring.

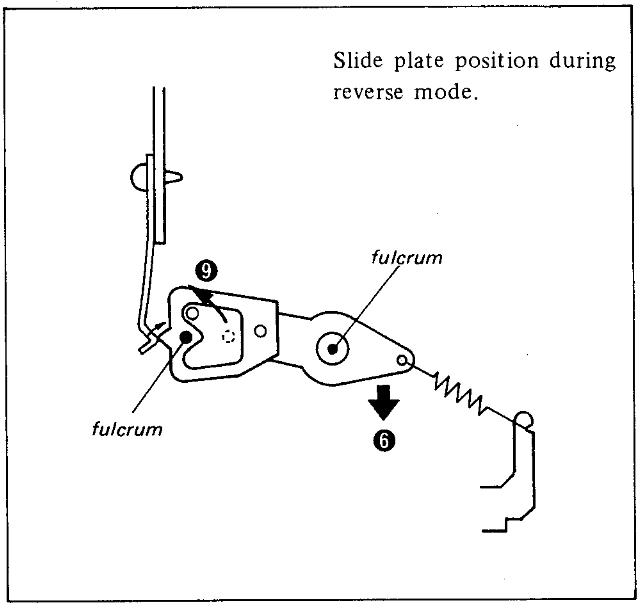
⑦ As the reverse gear rotates further, the head base return lever is pushed out in the direction shown by the arrow.

⑧ The head base plate and playback head move back. (Refer to section C, **page next page.)**

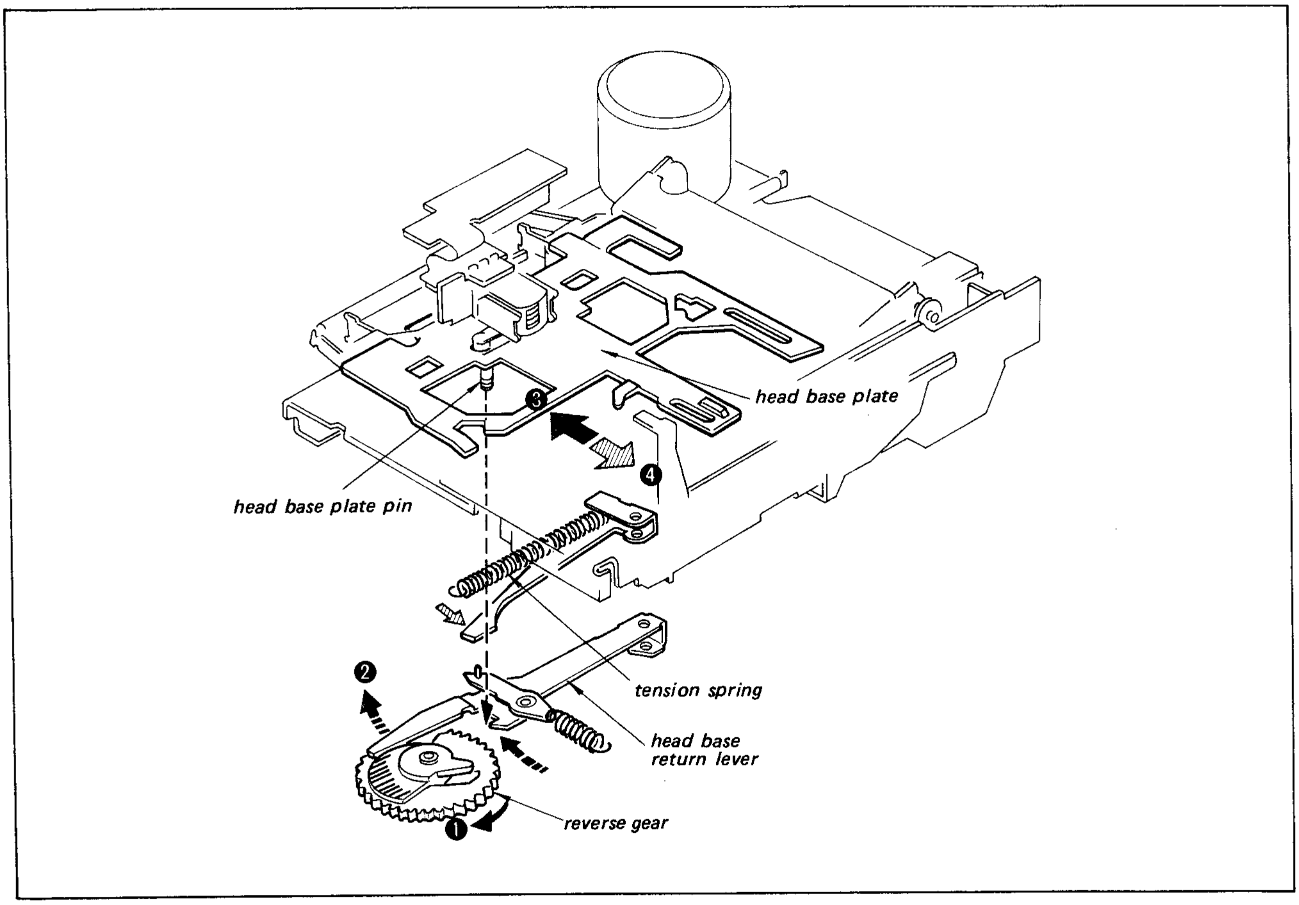
⑨ The switching cam is switched when pushed by the push lever pin coupled to the head base return lever.

- REV ➡ FWD


fulcrum
fulcrum
❺


Slide plate position during reverse mode.
❾
fulcrum
fulcrum
❻

C) Head Base Plate Operation


head base plate
❸
❹
head base plate pin
❷
tension spring
head base return lever
reverse gear
❶

❶ Reverse gear rotates when solenoid PM is activated.

❷ Head base return lever is pushed out by the slanted portion of the reverse gear.

❸ Head base plate moves back.

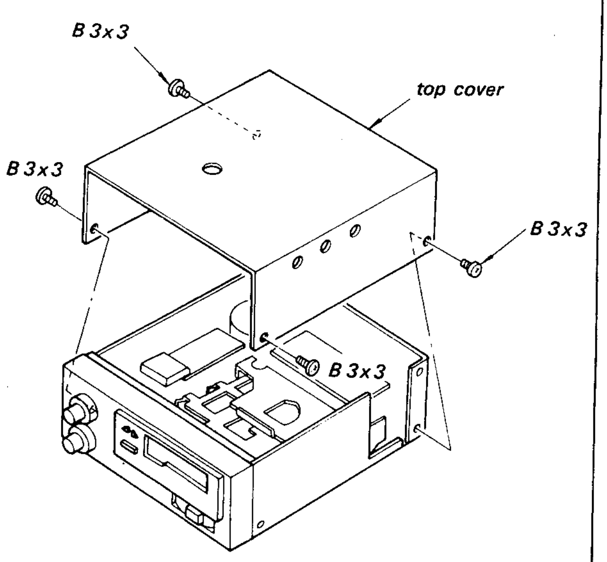
❹ After the FWD/REV switching operation has been completed, the head base plate (slanted portion of reverse gear) is moved forward by the tension spring.

SECTION 2
DISASSEMBLY

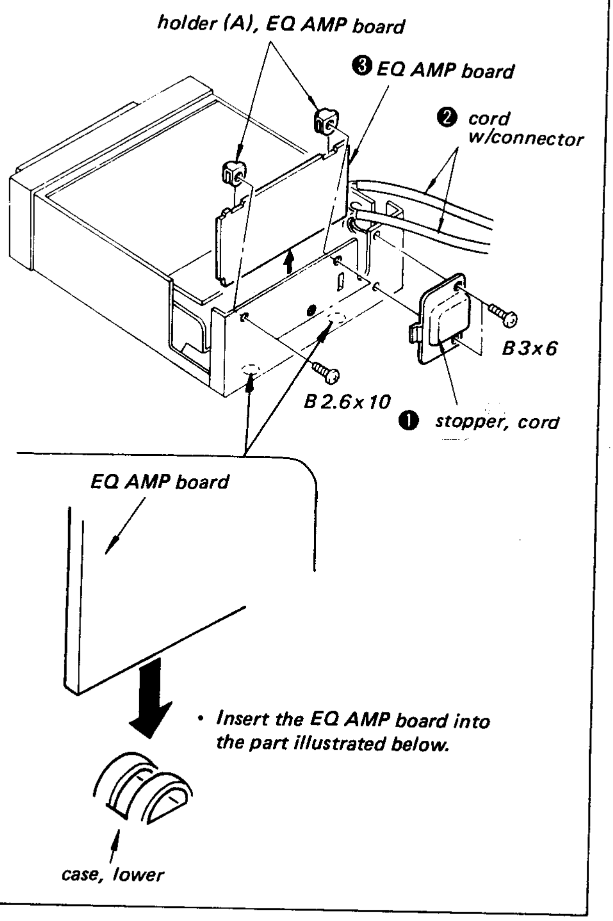
2-1. DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

TOP COVER

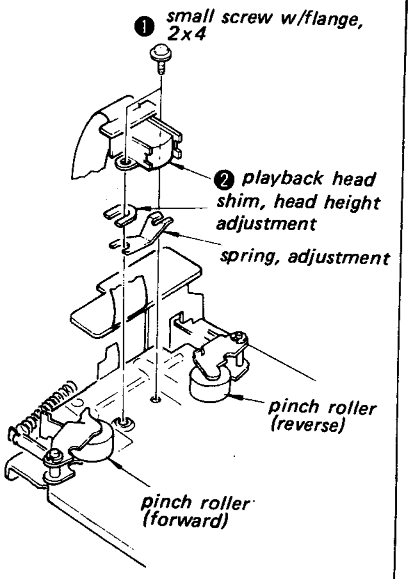

B 3x3
top cover
B 3x3
B 3x3
B 3x3

EQ AMP BOARD

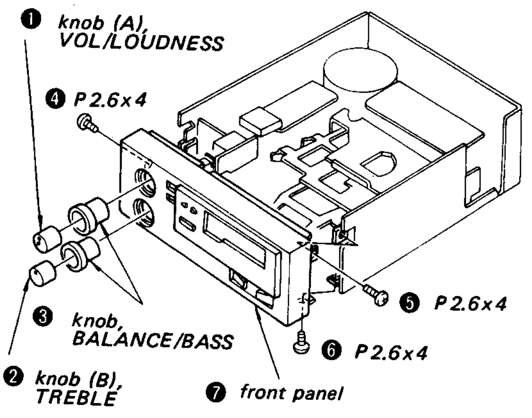

holder (A), EQ AMP board
❸ EQ AMP board
❷ cord w/connector
B 3x6
B 2.6x10
❶ stopper, cord
EQ AMP board
case, lower

- Insert the EQ AMP board into the part illustrated below.

PLAYBACK HEAD


❶ small screw w/flange, 2x4
❷ playback head
shim, head height adjustment
spring, adjustment
pinch roller (reverse)
pinch roller (forward)

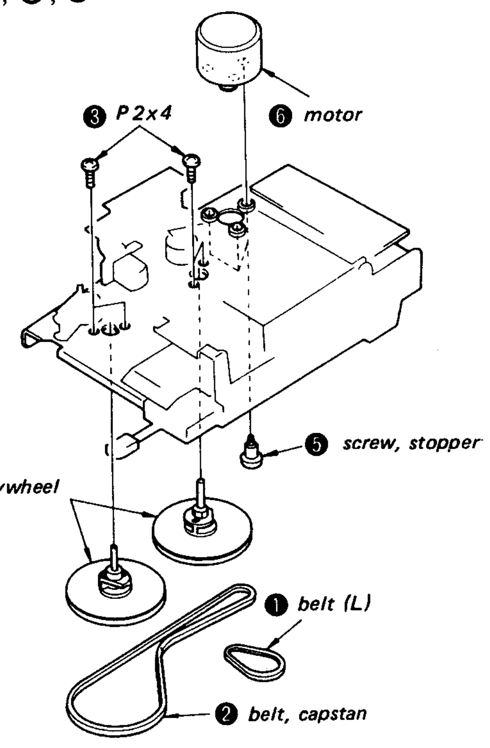
FRONT PANEL


❶ knob (A), VOL/LOUDNESS
❹ P2.6x4
❸ knob, BALANCE/BASS
❷ knob (B), TREBLE
❺ P2.6x4
❻ P2.6x4
❼ front panel

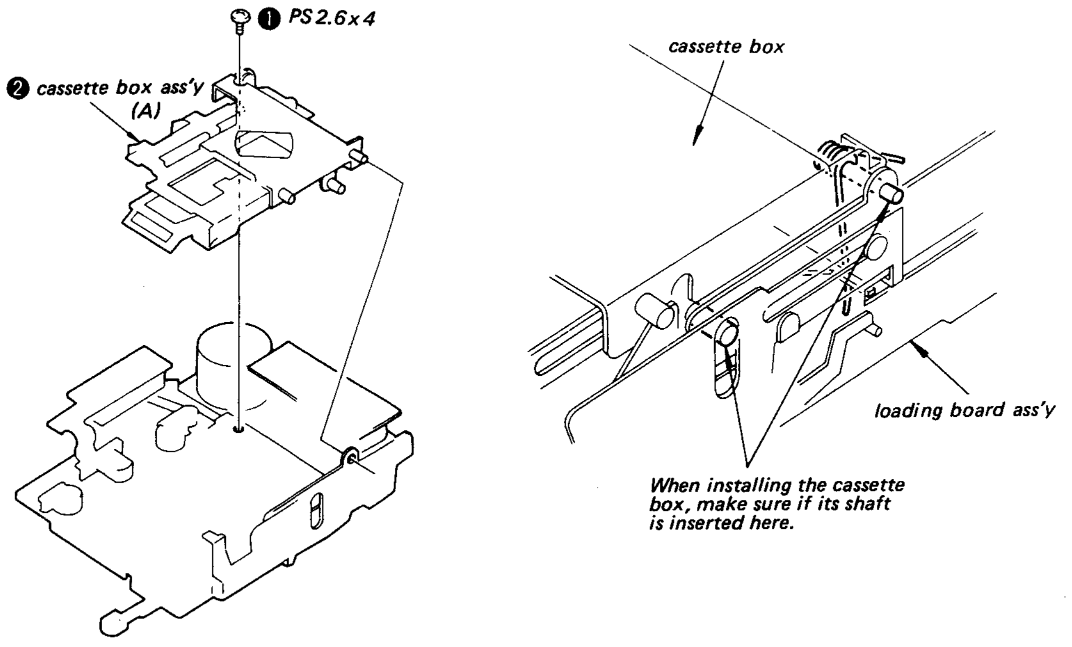
FLYWHEEL/MOTOR

❶ – ❹ : flywheel

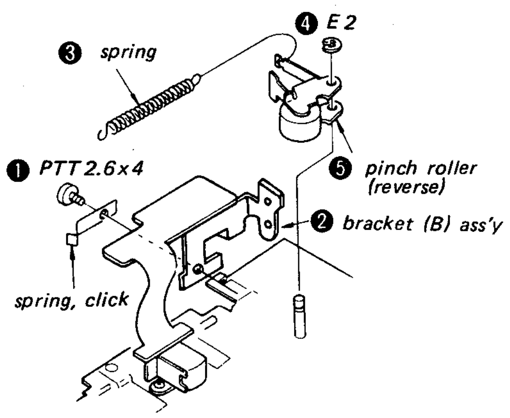
❶ , ❷ , ❺ , ❻ : motor


❸ P2x4
❻ motor
❺ screw, stopper
❹ flywheel
❶ belt (L)
❷ belt, capstan

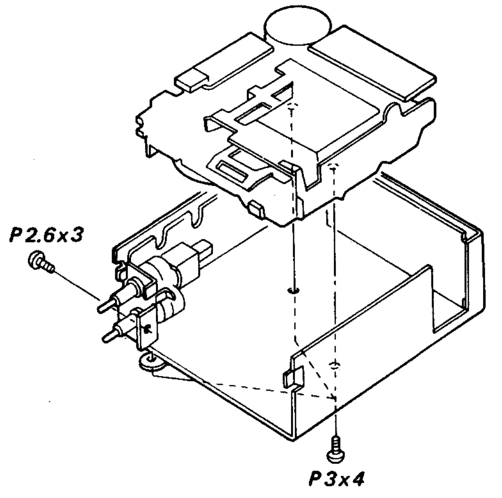
CASSETTE BOX ASS'Y


❶ PS2.6x4
❷ cassette box ass'y (A)
cassette box
loading board ass'y
When installing the cassette box, make sure if its shaft is inserted here.

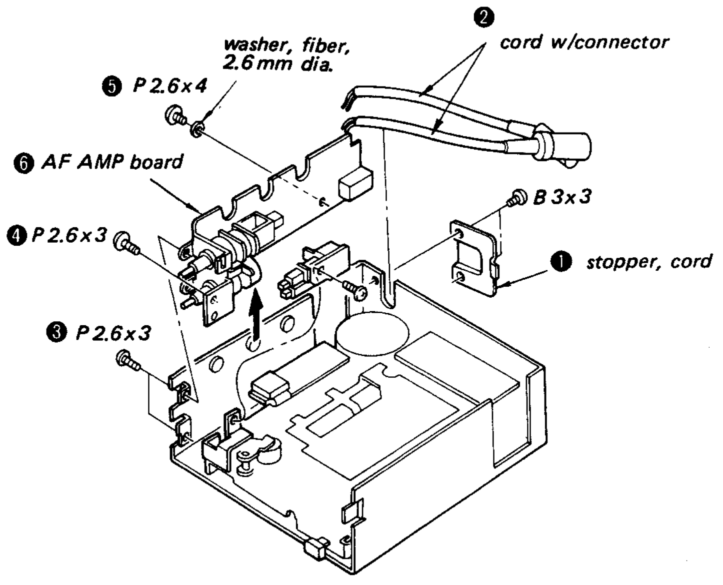
PINCH ROLLER (REVERSE)


❹ E2
❸ spring
❶ PTT2.6x4
❺ pinch roller (reverse)
❷ bracket (B) ass'y
spring, click

MECHANISM SECTION



AF AMP BOARD

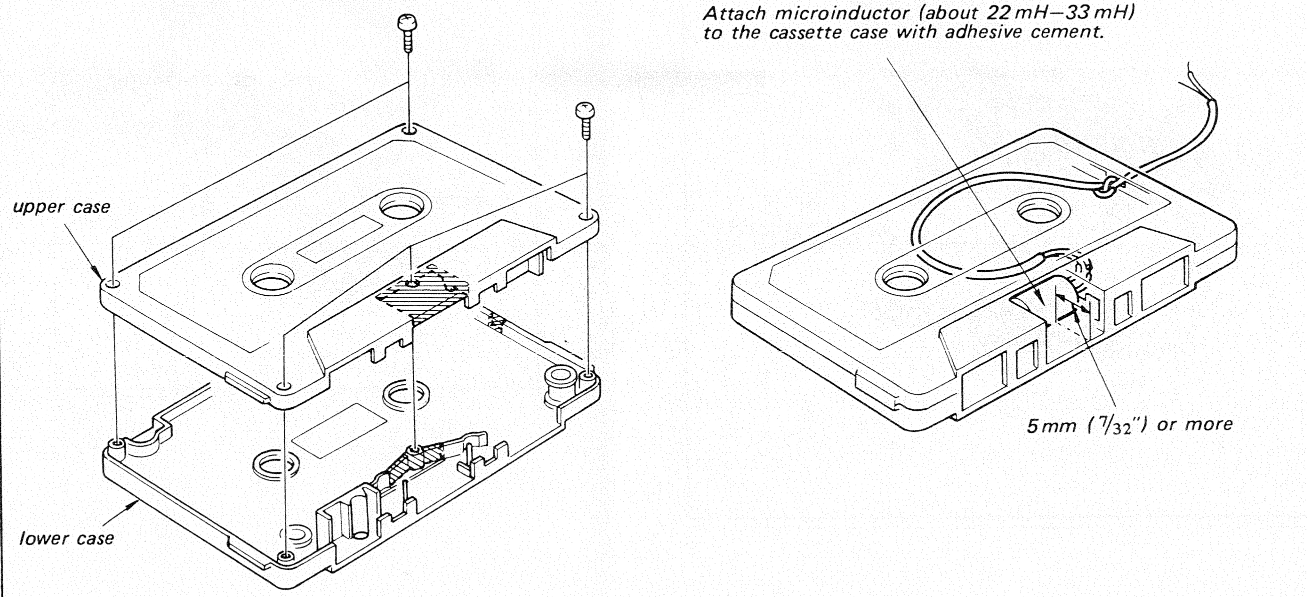

washer, fiber, 2.6mm dia.
❷ cord w/connector
❺ P2.6x4
❻ AF AMP board
B3x3
❹ P2.6x3
❶ stopper, cord
❸ P2.6x3

SECTION 3
ADJUSTMENTS

Dummy Cassette (Use cassette tape fixed by screws.)

1 Remove screws.
(Remove tape and guide roller, etc., too.)

2 Cut out hatched portions of the cassette case.


upper case
lower case

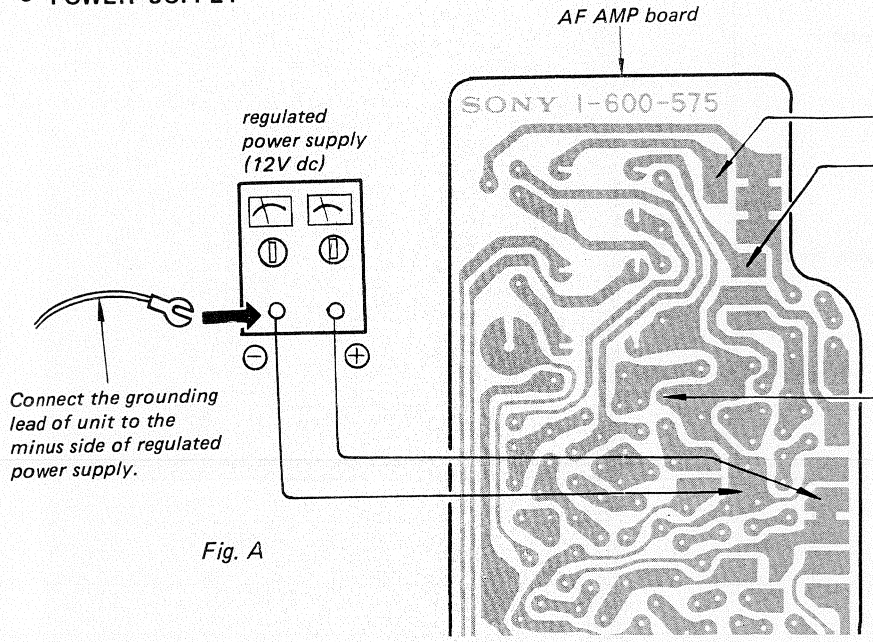
Attach microinductor (about 22 mH–33 mH) to the cassette case with adhesive cement.

5 mm (7/32") or more

Test Equipment Connection for Dolby Adjustment

Insert prerecorded tape and measure the voltage during playback mode with no signal.

- **POWER SUPPLY**


AF AMP board
SONY 1-600-575
regulated
power supply
(12V dc)
⊖
⊕

Connect the grounding lead of unit to the minus side of regulated power supply.

Fig. A

- **VTVM**

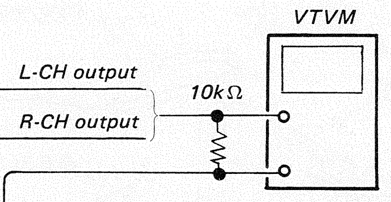

VTVM
L-CH output
R-CH output
10kΩ

Fig. B

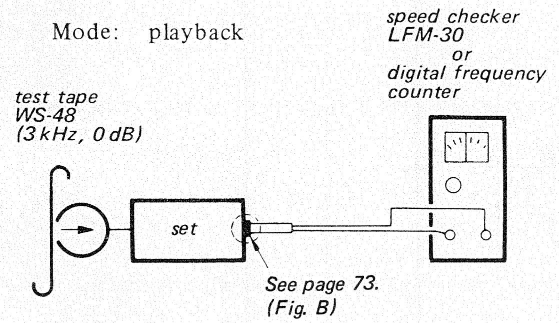
Tape Speed Adjustment

Setting:

VOL control: mechanical mid

Procedure:

Mode: playback


speed checker
LFM-30
or
digital frequency
counter
test tape
WS-48
(3 kHz, 0 dB)
set

See page 73. (Fig. B)

Specification:

Speed checker	Digital frequency counter
±0.3%	2,990–3,010 Hz

Frequency difference between the beginning and the end of the tape should be within ±0.3% (±10 Hz).

Adjustment Location:

– Servo AMP Board –

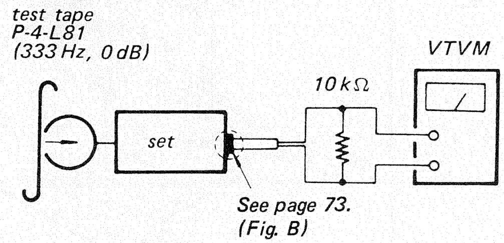
Playback Level Adjustment

Setting:

TAPE SELECT switch: TYPE I
DOLBY NR switch: ON

Procedure:

Mode: playback


test tape
P-4-L81
(333 Hz, 0 dB)
VTVM
10kΩ
set

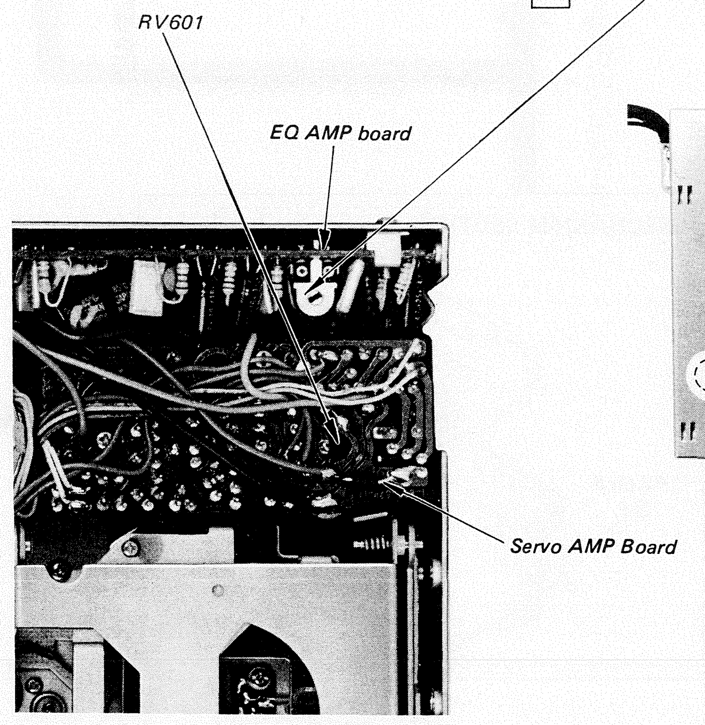
See page 73. (Fig. B)

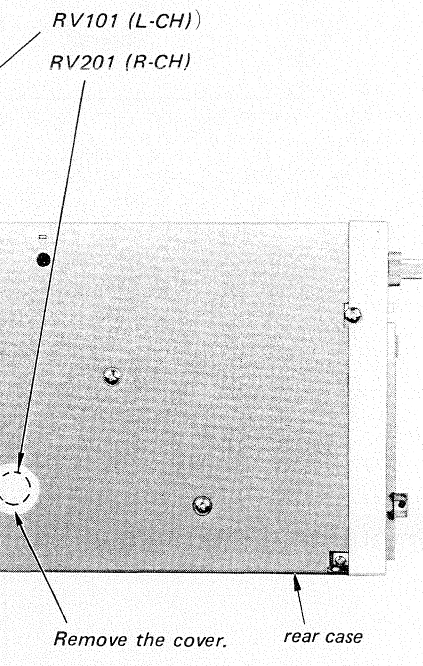
Specification:

LINE OUT level: 0.72 V
(–0.6 dB)

Adjustment Location:

– EQ AMP Board –

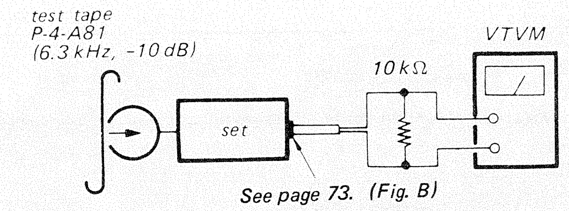

RV601
EQ AMP board
Servo AMP Board


RV101 (L-CH)
RV201 (R-CH)
Remove the cover.
rear case

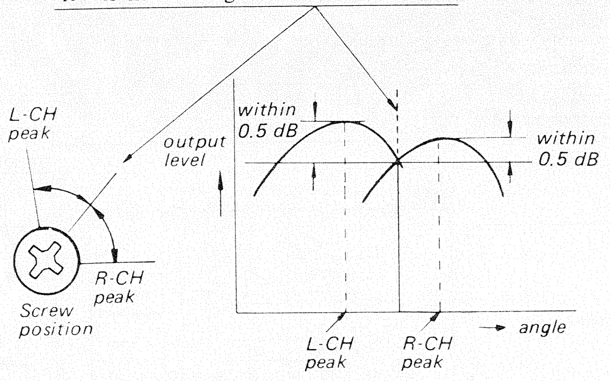
Playback Head Azimuth Adjustment

Procedure:

1. Mode: playback (FWD mode)

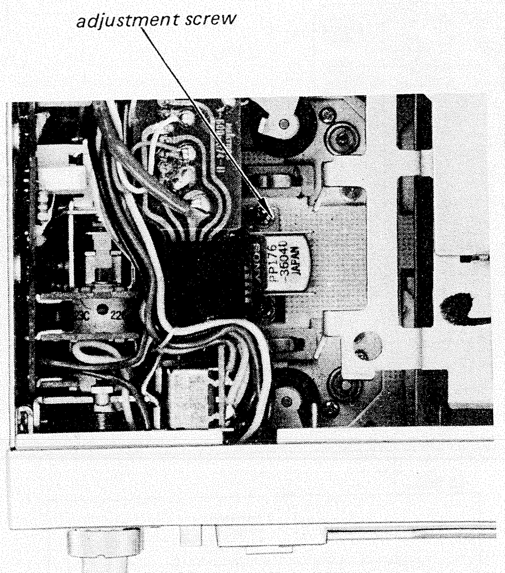

test tape
P-4-A81
(6.3 kHz, -10 dB)
VTVM
10 kΩ
set
See page 73. (Fig. B)

2. Turn the adjustment screw for the maximum output levels. If these levels do not match, turn the adjustment screw until both of output levels match together within 0.5 dB.

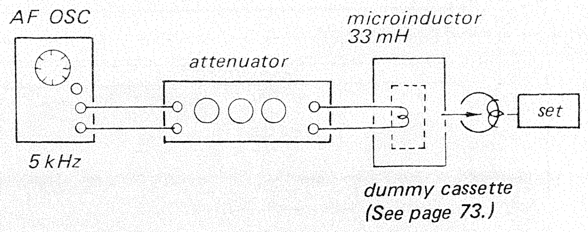

L-CH
peak
output
level
within
0.5 dB
within
0.5 dB
R-CH
peak
Screw
position
L-CH
peak
R-CH
peak
angle

3. Mode: playback (REV mode)
4. Make sure that the VTVM indicates the same output as obtained in FWD mode.
5. Tighten the adjustment screw with locking compound.

Adjustment Location:


adjustment screw

DOLBY NR Adjustment


AF OSC
5 kHz
attenuator
microinductor
33 mH
set
dummy cassette
(See page 73.)

Setting:

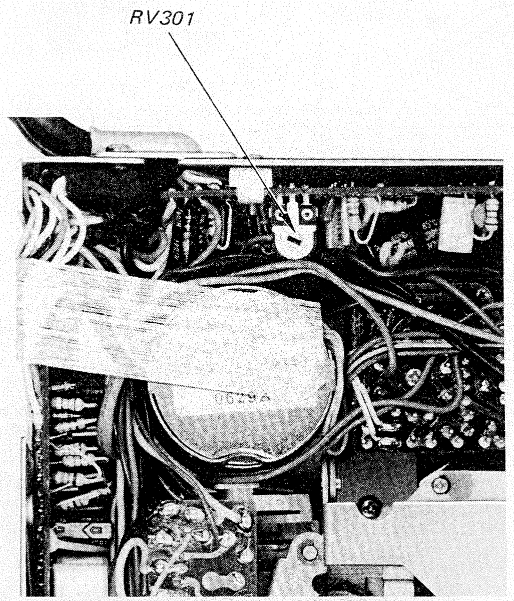
DOLBY NR switch: OFF

Procedure:

1. Adjust the attenuator for -20.4 dB (74 mV) on the VTVM indicated in Fig. B on page 73.
2. Set the DOLBY NR switch to ON.
3. Adjust RV301 for -30.4 ±0.25 dB (23.4 mV) on the VTVM.

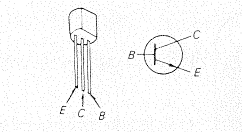
Adjustment Location:

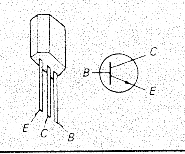
– EQ AMP Board –



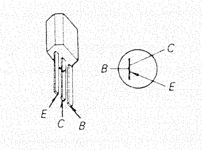
Semiconductor Lead Layouts

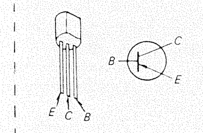
Q101, 102
Q201, 202
Q408, 601
Q401–404
: 2SC1364 2SC633A



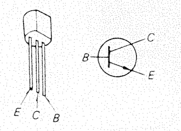


Q405: 2SA1027R 2SA733

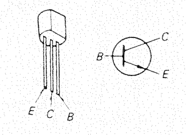




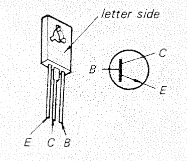
Q406, 407, 602: 2SC1474



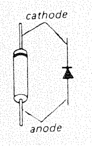
Q603: 2SC1474



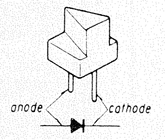
2SD862


letter side
E C B
B
C
E

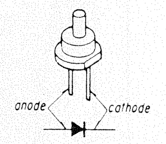
D101, 201: 1T22AM 1T22
D102, 103
D202, 203
D302
D401, 402
D404
D601, 602
: 1S1555 1T40
D301, 405: 10E2 10E1
D603–605: 10E2
D403, 606: RD3.9E
D607: RD9.1E


cathode
anode

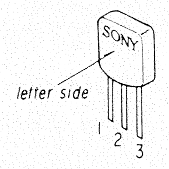
D801, 802: GL9NG6


anode
cathode

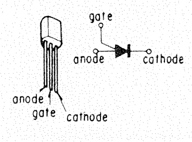
D803: GL2HY1


anode
cathode

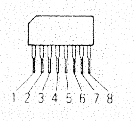
SDME1, 2: DM101A


SONY
letter side
1
2
3

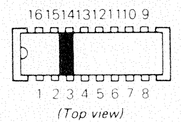
PUT601: N13T1


gate
anode
cathode
anode
gate
cathode

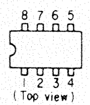
IC101: μPC1032H
IC603: CX069



IC102: HA11226


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
(Top view)

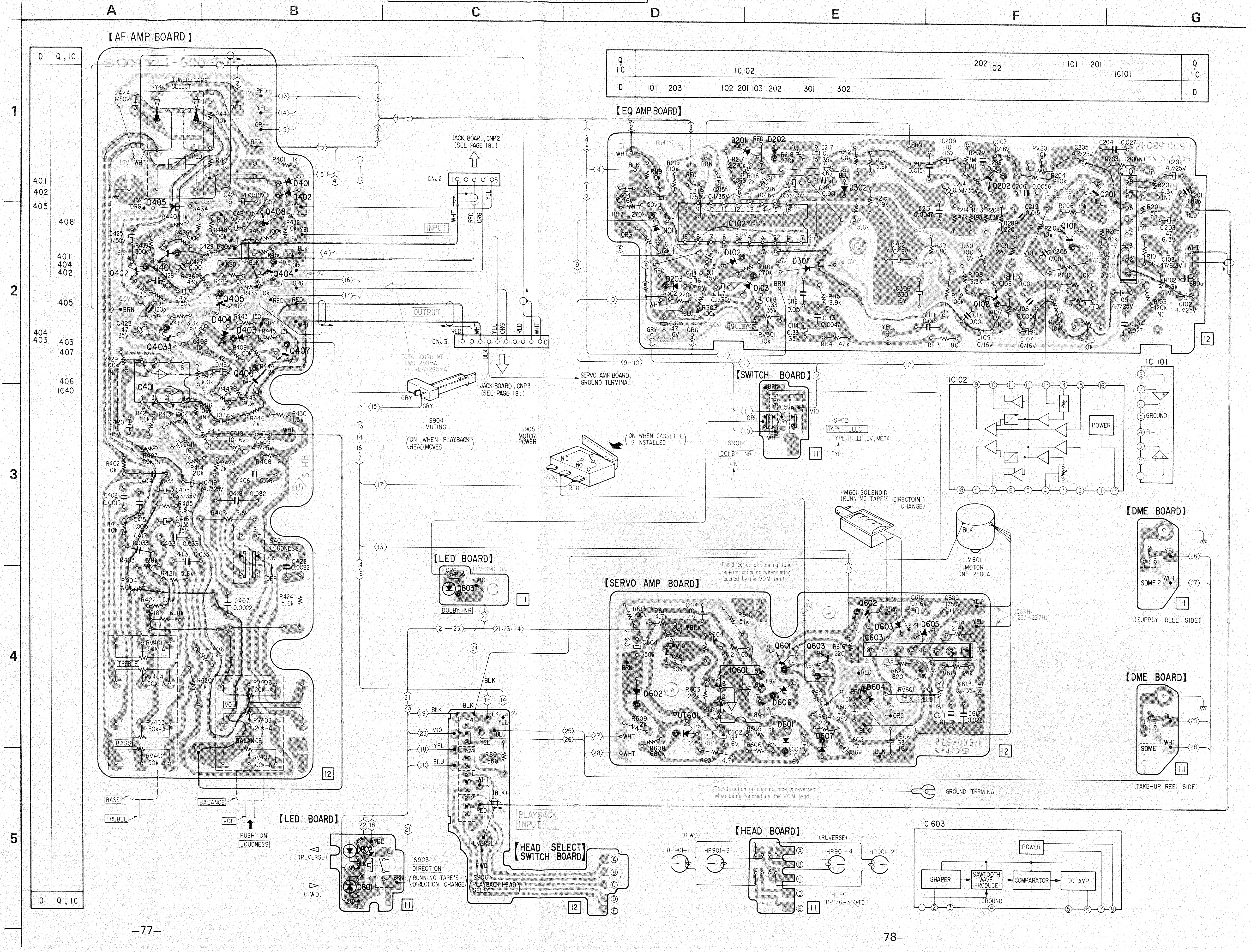
IC401, 601: μPC4558C


8 7 6 5
1 2 3 4
(Top view)

4-1. MOUNTING DIAGRAM

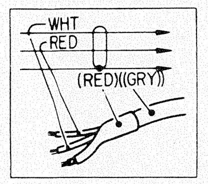
— Conductor Side —

(Refer to page 76 for semiconductor lead layouts.)


A
B
C
D
E
F
G
1
2
3
4
5
D
Q, IC
【AF AMP BOARD】
TUNER/TAPE SELECT
RY401
IC401
【EQ AMP BOARD】
IC102
IC101
JACK BOARD, CNP2 (SEE PAGE 18.)
CNJ2
INPUT
OUTPUT
CNJ3
JACK BOARD, CNP3 (SEE PAGE 18.)
TOTAL CURRENT
SERVO AMP BOARD, GROUND TERMINAL
S904 MUTING
(ON WHEN PLAYBACK HEAD MOVES)
S905 MOTOR POWER
(ON WHEN CASSETTE IS INSTALLED)
【SWITCH BOARD】
S901 DOLBY NR
ON
OFF
S902 TAPE SELECT
TYPE II, III, IV, METAL
TYPE I
POWER
GROUND
B+
PM601 SOLENOID (RUNNING TAPE'S DIRECTOIN CHANGE)
M601 MOTOR DNF-2800A
【DME BOARD】
SDME 2
(SUPPLY REEL SIDE)
SDME 1
(TAKE-UP REEL SIDE)
【LED BOARD】
DOLBY NR
D803
【SERVO AMP BOARD】
IC601
IC603
PUT601
TAPE SPEED
RV601
The direction of running tape repeats changing when being touched by the VOM lead.
The direction of running tape is reversed when being touched by the VOM lead.
GROUND TERMINAL
S401 LOUDNESS
TREBLE
BASS
VOL
BALANCE
RV401
RV402
RV403
RV404
RV405
RV406
PUSH ON LOUDNESS
(REVERSE)
(FWD)
D801
D802
S903 DIRECTION
(RUNNING TAPE'S DIRECTION CHANGE)
【HEAD SELECT SWITCH BOARD】
PLAYBACK INPUT
REVERSE
FWD
S906 (PLAYBACK HEAD SELECT)
【HEAD BOARD】
HP901-1
HP901-3
HP901-4
HP901-2
HP901 PP176-3604D
IC 603
SHAPER
SAWTOOTH WAVE PRODUCE
COMPARATOR
DC AMP
GROUND

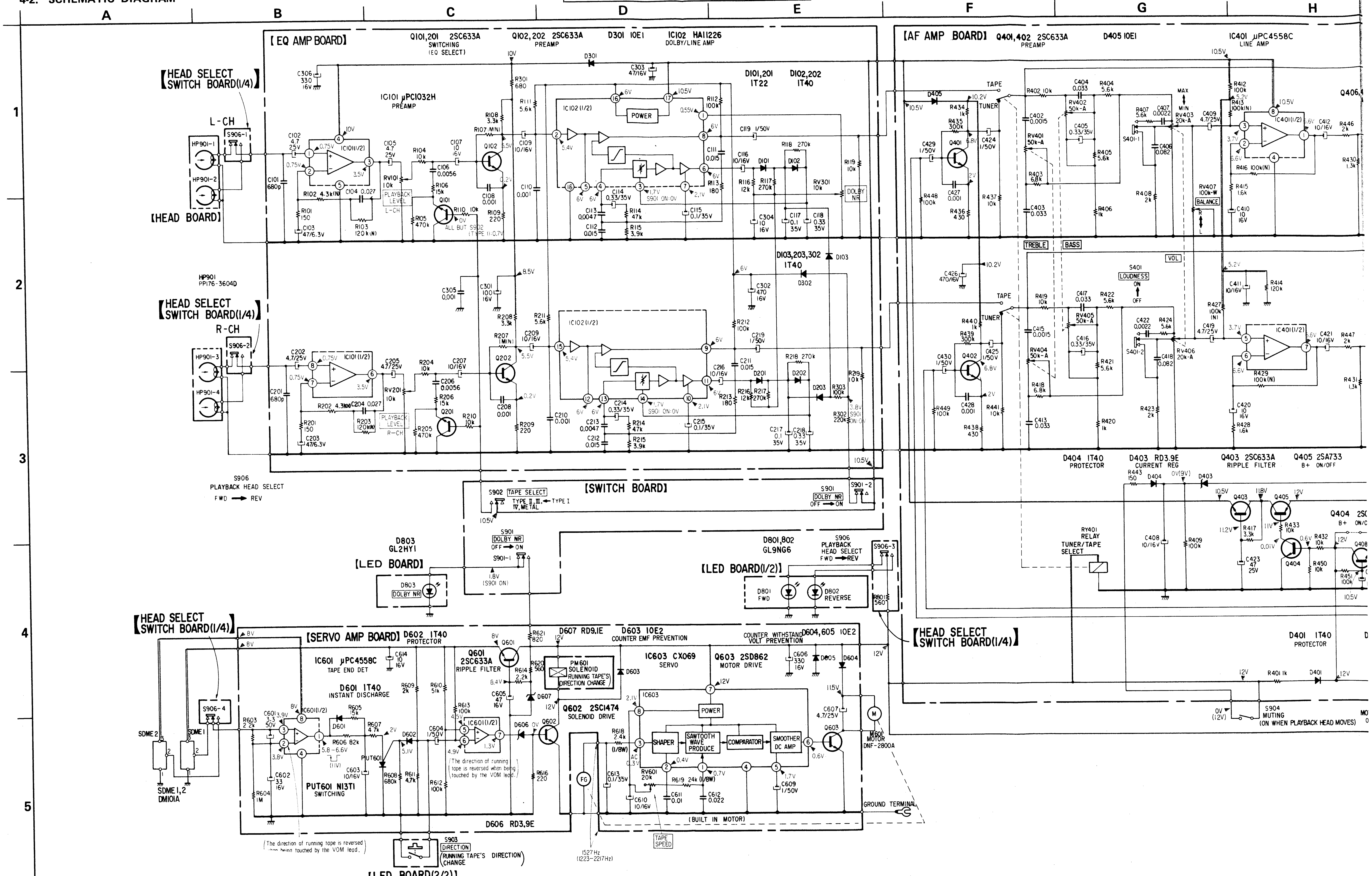
Note:

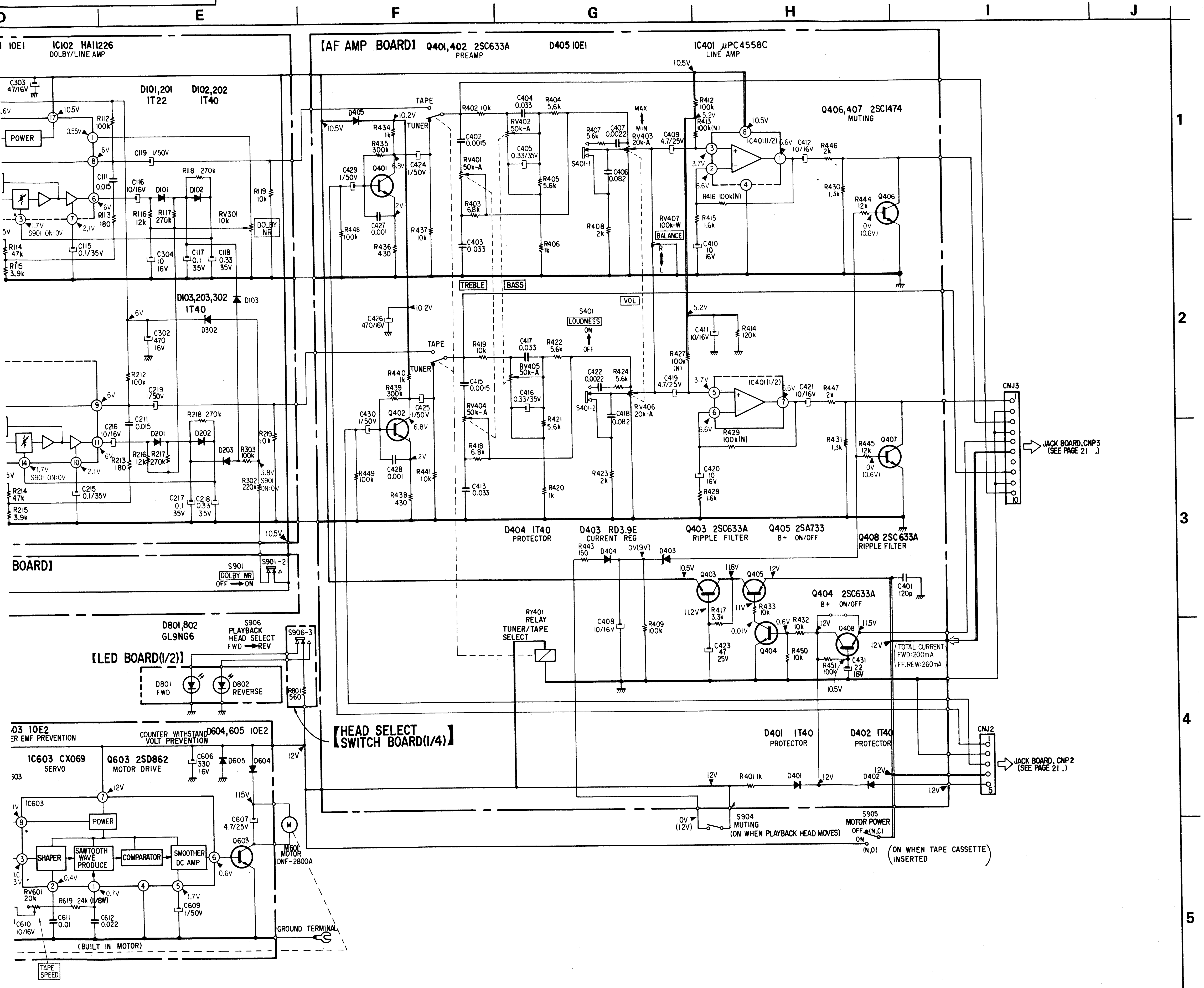
- Color code of sleeving over the end of the jacket.


WHT
RED
(RED)
(GRY)

- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- ▨ : B+ pattern
- ⇨ : signal path
- ⇨ : L-CH signal path
- ⇨ : R-CH signal path

4-2. SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
H
1
2
3
4
5
[EQ AMP BOARD]
Q101,201 2SC633A SWITCHING (EQ SELECT)
Q102,202 2SC633A PREAMP
D301 10E1
IC102 HA11226 DOLBY/LINE AMP
IC101 μPC1032H PREAMP
D101,201 1T22
D102,202 1T40
POWER
DOLBY NR
PLAYBACK LEVEL L-CH
PLAYBACK LEVEL R-CH
ALL BUT S902 (TYPE I):0.7V
D103,203,302 1T40
[HEAD SELECT SWITCH BOARD(1/4)]
L-CH
R-CH
HP901-1
HP901-2
HP901-3
HP901-4
[HEAD BOARD]
HP901 PP176-3604D
S906 PLAYBACK HEAD SELECT FWD → REV
[SWITCH BOARD]
S902 TAPE SELECT TYPE II, III, IV, METAL ← TYPE I
S901 DOLBY NR OFF → ON
S901-2
D803 GL2HY1
[LED BOARD]
D803 DOLBY NR
1.8V (S901 ON)
D801,802 GL9NG6
S906 PLAYBACK HEAD SELECT FWD → REV
[LED BOARD(1/2)]
D801 FWD
D802 REVERSE
S906-3
[SERVO AMP BOARD]
D602 1T40 PROTECTOR
D607 RD9.1E
D603 10E2 COUNTER EMF PREVENTION
COUNTER WITHSTAND VOLT PREVENTION
D604,605 10E2
IC601 μPC4558C TAPE END DET
Q601 2SC633A RIPPLE FILTER
PM601 SOLENOID RUNNING TAPE'S DIRECTION CHANGE
IC603 CX069 SERVO
Q603 2SD862 MOTOR DRIVE
D601 1T40 INSTANT DISCHARGE
Q602 2SC1474 SOLENOID DRIVE
PUT601 N13T1 SWITCHING
The direction of running tape is reversed when being touched by the VOM lead.
SHAPER
SAWTOOTH WAVE PRODUCE
COMPARATOR
SMOOTHER DC AMP
POWER
FG
M601 MOTOR DNF-2800A
GROUND TERMINAL
(BUILT IN MOTOR)
D606 RD3.9E
TAPE SPEED
1527Hz (1223~2217Hz)
S903 DIRECTION (RUNNING TAPE'S DIRECTION CHANGE)
[LED BOARD(2/2)]
SDME2
SDME1
SDME1,2 DM101A
S906-4
[AF AMP BOARD]
Q401,402 2SC633A PREAMP
D405 10E1
IC401 μPC4558C LINE AMP
TAPE
TUNER
TREBLE
BASS
VOL
MAX
MIN
BALANCE
S401 LOUDNESS ON OFF
S401-1
S401-2
D404 1T40 PROTECTOR
D403 RD3.9E CURRENT REG
Q403 2SC633A RIPPLE FILTER
Q405 2SA733 B+ ON/OFF
Q404 B+ ON/OFF
RY401 RELAY TUNER/TAPE SELECT
D401 1T40 PROTECTOR
S904 MUTING (ON WHEN PLAYBACK HEAD MOVES)
Q406
Q408


D
E
F
G
H
I
J
1
2
3
4
5
IC102 HA11226
DOLBY/LINE AMP
D101,201 1T22
D102,202 1T40
D103,203,302 1T40
POWER
S901 ON:OV
DOLBY NR
[AF AMP BOARD]
Q401,402 2SC633A
PREAMP
D405 10E1
IC401 μPC4558C
LINE AMP
Q406,407 2SC1474
MUTING
TAPE
TUNER
TREBLE
BASS
VOL
BALANCE
S401
LOUDNESS
ON
OFF
MAX
MIN
D404 1T40
PROTECTOR
D403 RD3.9E
CURRENT REG
Q403 2SC633A
RIPPLE FILTER
Q405 2SA733
B+ ON/OFF
Q408 2SC633A
RIPPLE FILTER
Q404 2SC633A
B+ ON/OFF
RY401
RELAY
TUNER/TAPE
SELECT
TOTAL CURRENT
FWD:200mA
FF,REW:260mA
CNJ3
JACK BOARD,CNP3
(SEE PAGE 21 .)
CNJ2
JACK BOARD, CNP2
(SEE PAGE 21 .)
D401 1T40
PROTECTOR
D402 1T40
PROTECTOR
S904
MUTING
(ON WHEN PLAYBACK HEAD MOVES)
S905
MOTOR POWER
OFF (N.C)
ON
(N.O)
(ON WHEN TAPE CASSETTE INSERTED)
BOARD]
S901
DOLBY NR
OFF ⟶ ON
D801,802
GL9NG6
S906
PLAYBACK
HEAD SELECT
FWD ⟶ REV
[LED BOARD(1/2)]
D801
FWD
D802
REVERSE
[HEAD SELECT SWITCH BOARD(1/4)]
03 10E2
ER EMF PREVENTION
COUNTER WITHSTAND VOLT PREVENTION
D604,605 10E2
IC603 CX069
SERVO
Q603 2SD862
MOTOR DRIVE
POWER
SHAPER
SAWTOOTH WAVE PRODUCE
COMPARATOR
SMOOTHER DC AMP
M601
MOTOR
DNF-2800A
GROUND TERMINAL
(BUILT IN MOTOR)
TAPE SPEED

Note:

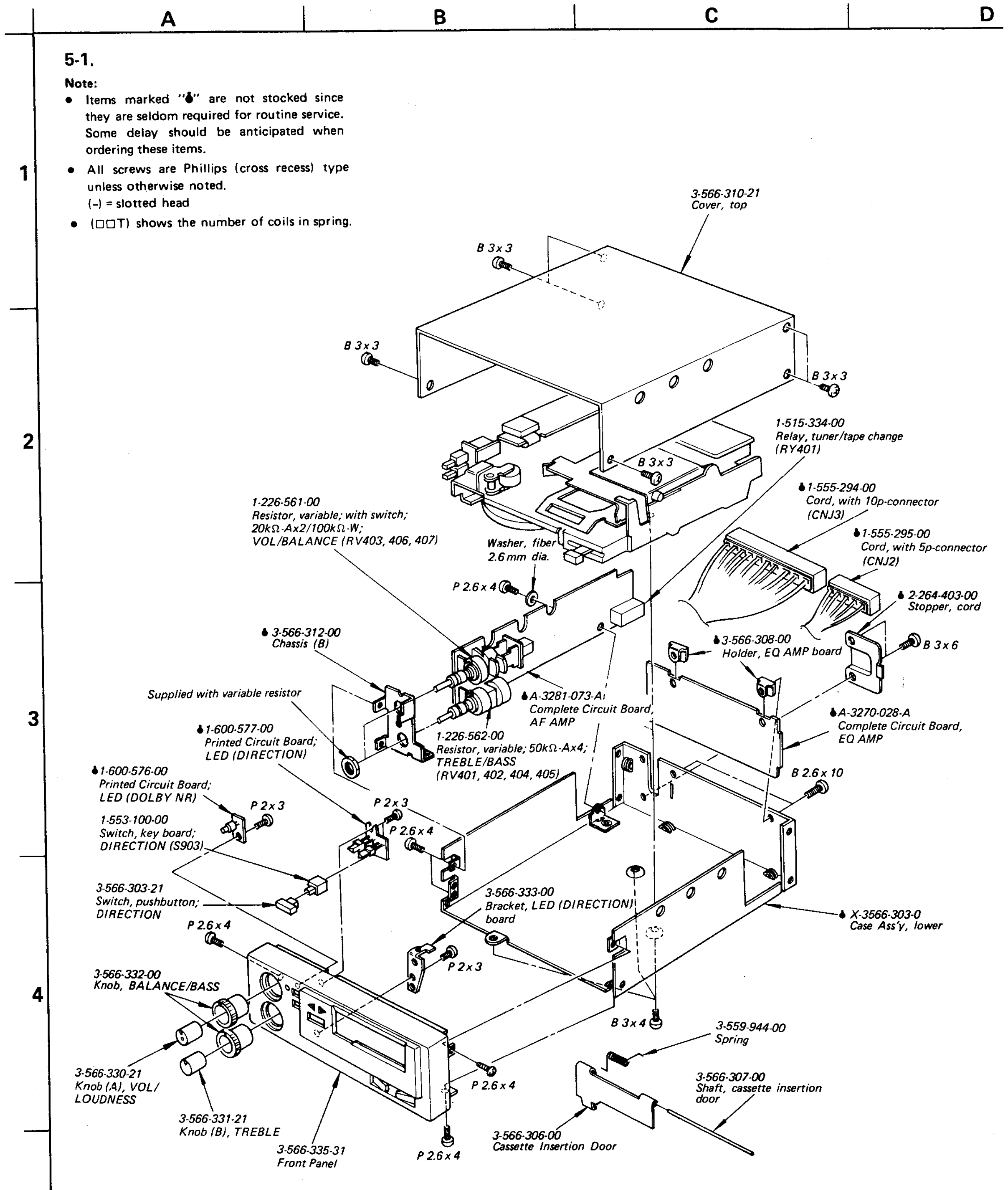
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- (N) : low-noise resistor.
- ▭ : adjustment for repair.
- ——: B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  ( ): when direction of running tape is changed by pushing S903
- Voltage variations may be noted due to normal production tolerances.
- Total current is measured with no cassette installed.

SECTION 5
EXPLODED VIEWS

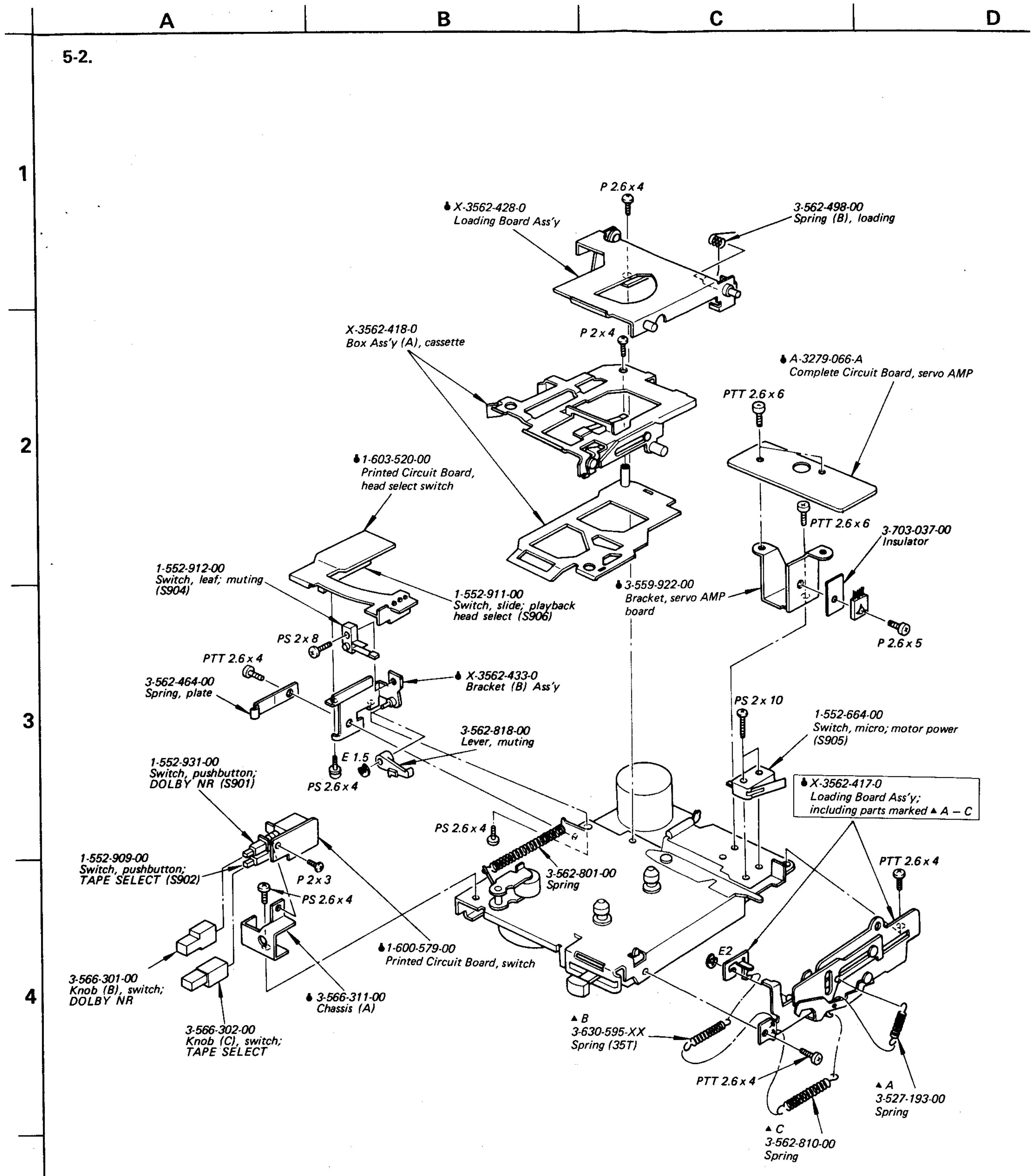
5-1.

Note:

- Items marked "🌢" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All screws are Phillips (cross recess) type unless otherwise noted. (-) = slotted head
- (□□T) shows the number of coils in spring.


A
B
C
D
1
2
3
4
5
3-566-310-21 Cover, top
B 3x3
B 3x3
B 3x3
B 3x3
1-515-334-00 Relay, tuner/tape change (RY401)
🌢1-555-294-00 Cord, with 10p-connector (CNJ3)
🌢1-555-295-00 Cord, with 5p-connector (CNJ2)
🌢 2-264-403-00 Stopper, cord
B 3x6
1-226-561-00 Resistor, variable; with switch; 20kΩ-Ax2/100kΩ-W; VOL/BALANCE (RV403, 406, 407)
Washer, fiber 2.6 mm dia.
P 2.6x4
🌢 3-566-308-00 Holder, EQ AMP board
🌢 3-566-312-00 Chassis (B)
Supplied with variable resistor
🌢A-3281-073-A Complete Circuit Board, AF AMP
🌢A-3270-028-A Complete Circuit Board, EQ AMP
🌢1-600-577-00 Printed Circuit Board; LED (DIRECTION)
1-226-562-00 Resistor, variable; 50kΩ-Ax4; TREBLE/BASS (RV401, 402, 404, 405)
B 2.6x10
🌢1-600-576-00 Printed Circuit Board; LED (DOLBY NR)
P 2x3
P 2x3
P 2.6x4
1-553-100-00 Switch, key board; DIRECTION (S903)
3-566-303-21 Switch, pushbutton; DIRECTION
3-566-333-00 Bracket, LED (DIRECTION) board
🌢 X-3566-303-0 Case Ass'y, lower
P 2.6x4
P 2x3
3-566-332-00 Knob, BALANCE/BASS
B 3x4
3-559-944-00 Spring
3-566-330-21 Knob (A), VOL/ LOUDNESS
P 2.6x4
3-566-307-00 Shaft, cassette insertion door
3-566-331-21 Knob (B), TREBLE
3-566-335-31 Front Panel
P 2.6x4
3-566-306-00 Cassette Insertion Door

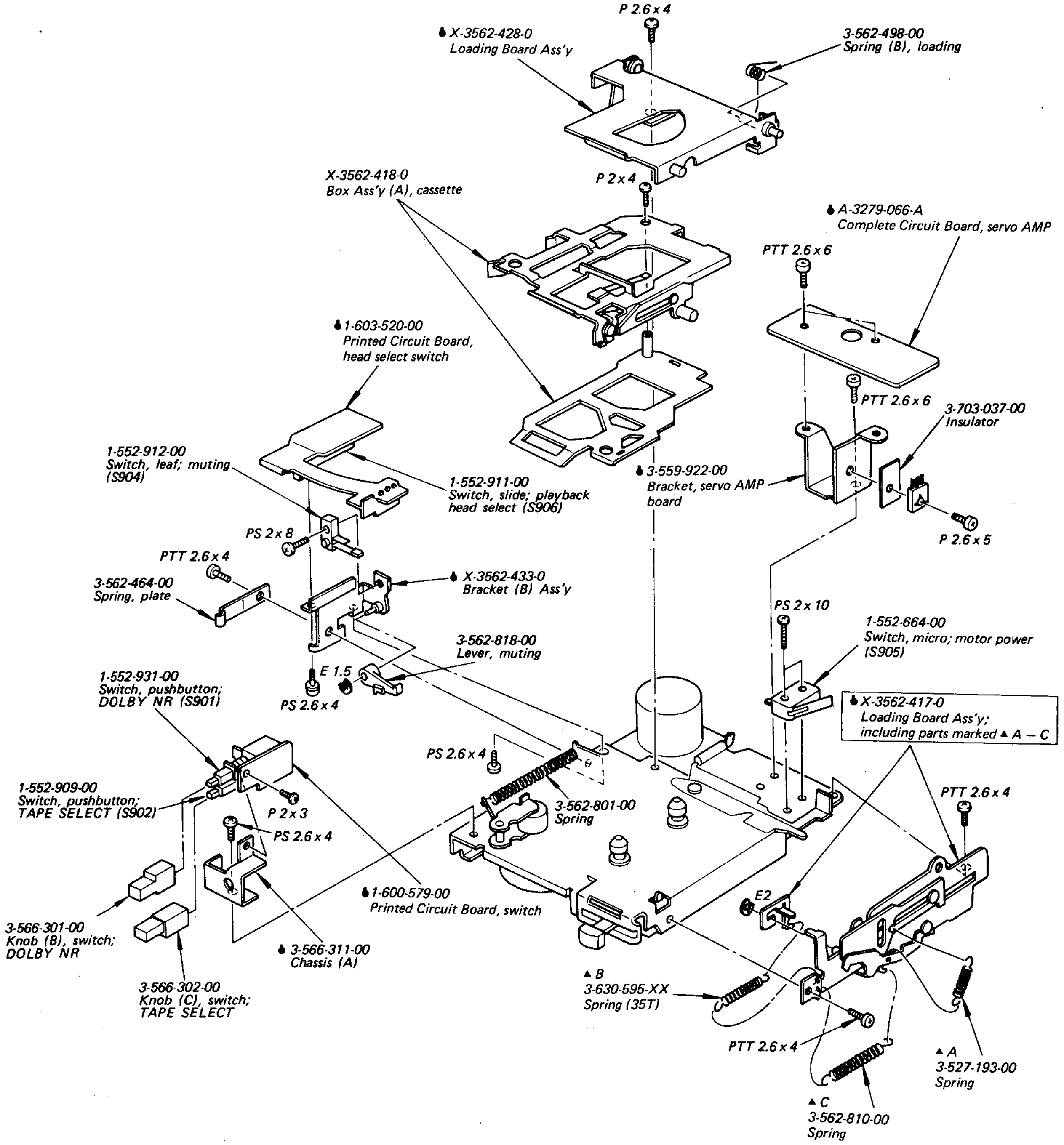
5-2.


A
B
C
D
1
2
3
4
5
P 2.6x4
🌢 X-3562-428-0 Loading Board Ass'y
3-562-498-00 Spring (B), loading
X-3562-418-0 Box Ass'y (A), cassette
P 2x4
🌢 A-3279-066-A Complete Circuit Board, servo AMP
PTT 2.6x6
🌢1-603-520-00 Printed Circuit Board, head select switch
PTT 2.6x6
3-703-037-00 Insulator
1-552-912-00 Switch, leaf; muting (S904)
1-552-911-00 Switch, slide; playback head select (S906)
🌢 3-559-922-00 Bracket, servo AMP board
P 2.6x5
PS 2x8
PTT 2.6x4
🌢 X-3562-433-0 Bracket (B) Ass'y
3-562-464-00 Spring, plate
PS 2x10
1-552-664-00 Switch, micro; motor power (S905)
3-562-818-00 Lever, muting
E 1.5
PS 2.6x4
1-552-931-00 Switch, pushbutton; DOLBY NR (S901)
🌢 X-3562-417-0 Loading Board Ass'y; including parts marked ▲ A – C
PS 2.6x4
3-562-801-00 Spring
1-552-909-00 Switch, pushbutton; TAPE SELECT (S902)
P 2x3
PS 2.6x4
PTT 2.6x4
🌢1-600-579-00 Printed Circuit Board, switch
E2
3-566-301-00 Knob (B), switch; DOLBY NR
🌢 3-566-311-00 Chassis (A)
▲ B 3-630-595-XX Spring (35T)
3-566-302-00 Knob (C), switch; TAPE SELECT
PTT 2.6x4
▲ A 3-527-193-00 Spring
▲ C 3-562-810-00 Spring

5-3.

A B C D

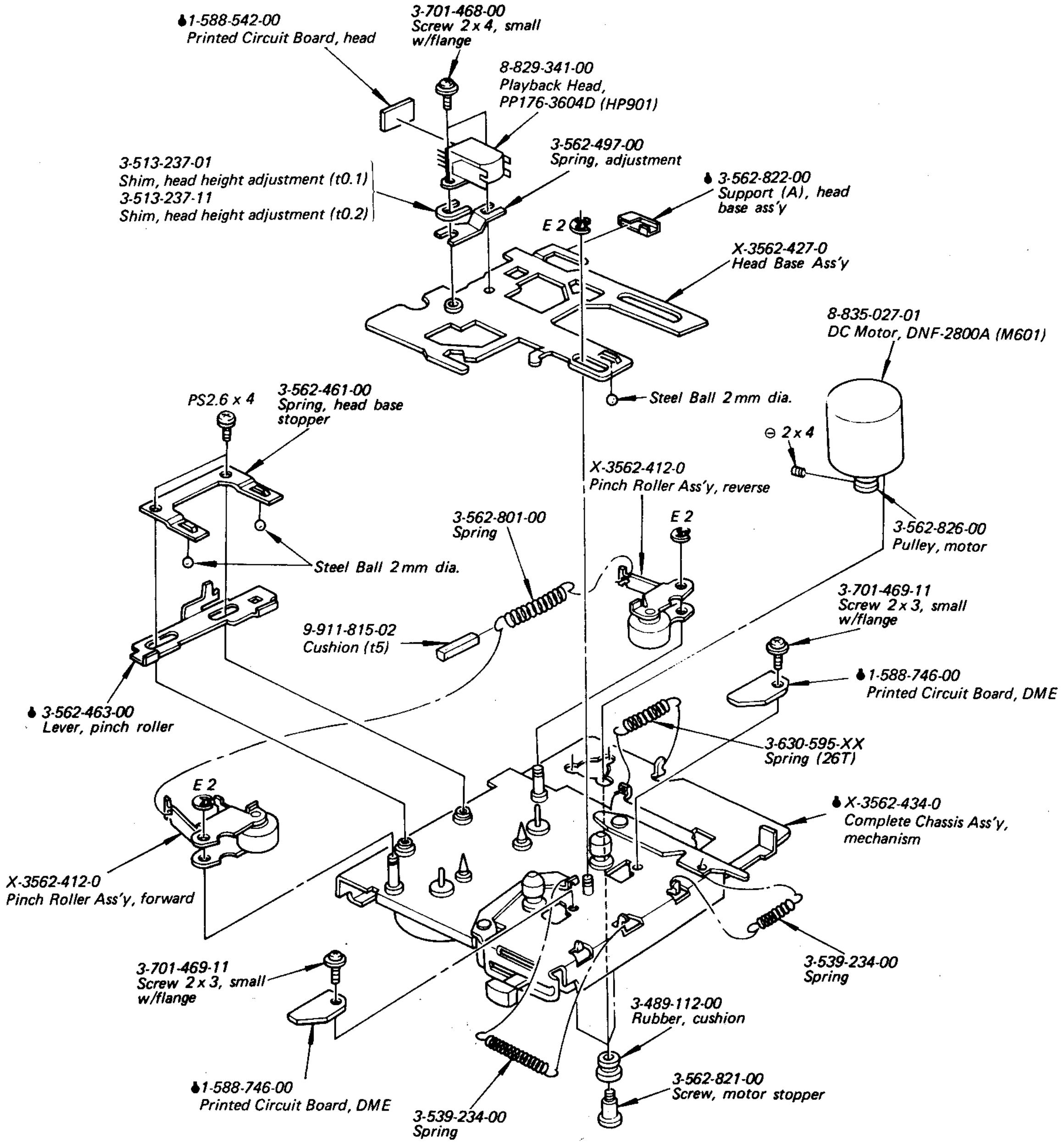
5-2.


P 2.6 x 4
● X-3562-428-0
Loading Board Ass'y
3-562-498-00
Spring (B), loading
X-3562-418-0
Box Ass'y (A), cassette
P 2 x 4
● A-3279-066-A
Complete Circuit Board, servo AMP
PTT 2.6 x 6
● 1-603-520-00
Printed Circuit Board,
head select switch
PTT 2.6 x 6
3-703-037-00
Insulator
1-552-912-00
Switch, leaf; muting
(S904)
1-552-911-00
Switch, slide; playback
head select (S906)
● 3-559-922-00
Bracket, servo AMP
board
P 2.6 x 5
PS 2 x 8
PTT 2.6 x 4
3-562-464-00
Spring, plate
● X-3562-433-0
Bracket (B) Ass'y
PS 2 x 10
1-552-664-00
Switch, micro; motor power
(S905)
3-562-818-00
Lever, muting
E 1.5
PS 2.6 x 4
1-552-931-00
Switch, pushbutton;
DOLBY NR (S901)
● X-3562-417-0
Loading Board Ass'y;
including parts marked ▲ A – C
PS 2.6 x 4
3-562-801-00
Spring
PTT 2.6 x 4
1-552-909-00
Switch, pushbutton;
TAPE SELECT (S902)
P 2 x 3
PS 2.6 x 4
E2
● 1-600-579-00
Printed Circuit Board, switch
3-566-301-00
Knob (B), switch;
DOLBY NR
● 3-566-311-00
Chassis (A)
▲ B
3-630-595-XX
Spring (35T)
3-566-302-00
Knob (C), switch;
TAPE SELECT
PTT 2.6 x 4
▲ A
3-527-193-00
Spring
▲ C
3-562-810-00
Spring

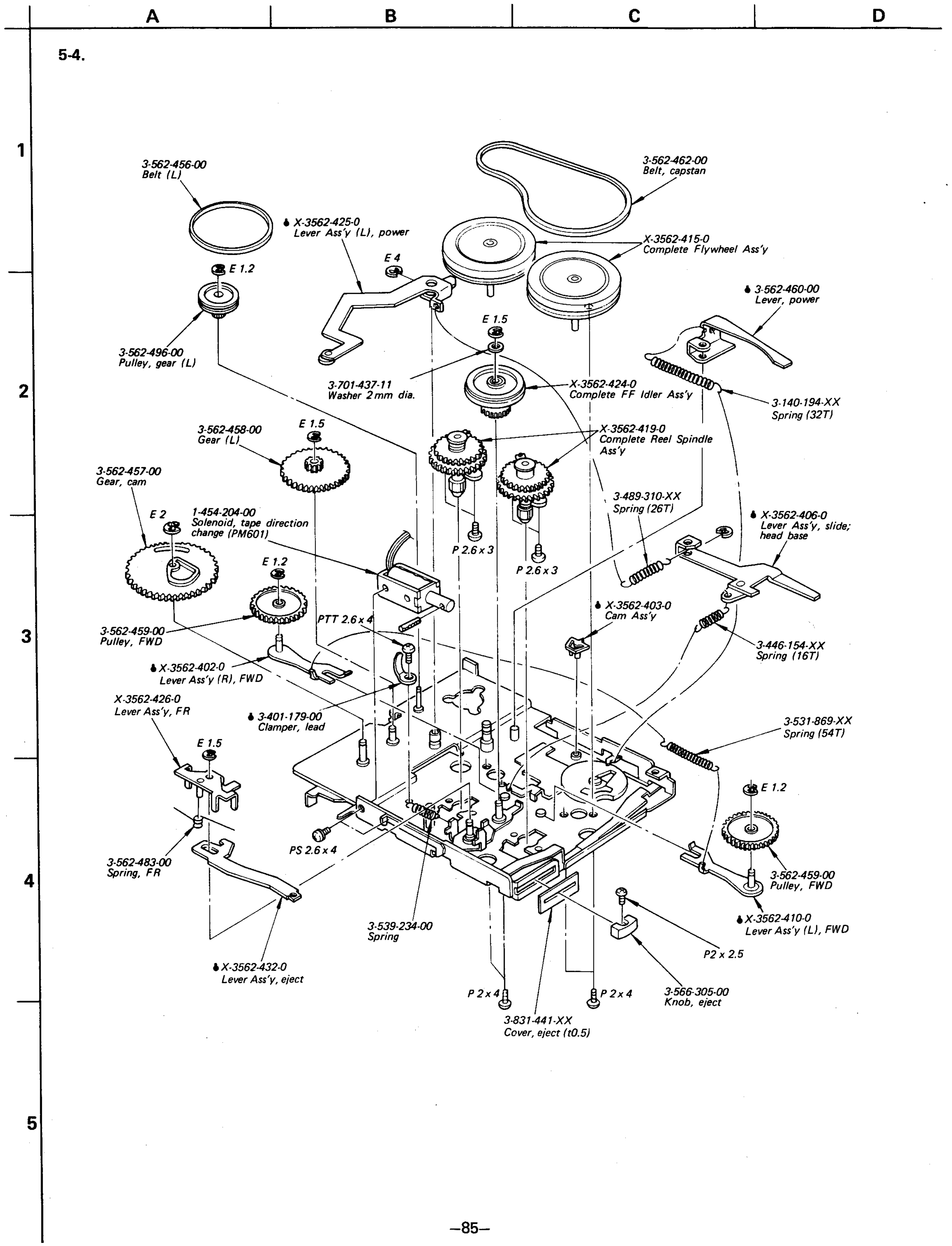
A B C D

5-3.

1
2
3
4
5


● 1-588-542-00
Printed Circuit Board, head
3-701-468-00
Screw 2 x 4, small
w/flange
8-829-341-00
Playback Head,
PP176-3604D (HP901)
3-562-497-00
Spring, adjustment
3-513-237-01
Shim, head height adjustment (t0.1)
3-513-237-11
Shim, head height adjustment (t0.2)
● 3-562-822-00
Support (A), head
base ass'y
E 2
X-3562-427-0
Head Base Ass'y
8-835-027-01
DC Motor, DNF-2800A (M601)
Steel Ball 2 mm dia.
PS2.6 x 4
3-562-461-00
Spring, head base
stopper
⊖ 2 x 4
X-3562-412-0
Pinch Roller Ass'y, reverse
3-562-801-00
Spring
E 2
3-562-826-00
Pulley, motor
Steel Ball 2 mm dia.
3-701-469-11
Screw 2 x 3, small
w/flange
9-911-815-02
Cushion (t5)
● 1-588-746-00
Printed Circuit Board, DME
● 3-562-463-00
Lever, pinch roller
3-630-595-XX
Spring (26T)
E 2
● X-3562-434-0
Complete Chassis Ass'y,
mechanism
X-3562-412-0
Pinch Roller Ass'y, forward
3-539-234-00
Spring
3-701-469-11
Screw 2 x 3, small
w/flange
3-489-112-00
Rubber, cushion
3-562-821-00
Screw, motor stopper
● 1-588-746-00
Printed Circuit Board, DME
3-539-234-00
Spring

5-4.


A
B
C
D
1
2
3
4
5
3-562-456-00
Belt (L)
♠ X-3562-425-0
Lever Ass'y (L), power
E 4
E 1.2
3-562-496-00
Pulley, gear (L)
3-562-462-00
Belt, capstan
X-3562-415-0
Complete Flywheel Ass'y
♠ 3-562-460-00
Lever, power
E 1.5
3-701-437-11
Washer 2mm dia.
X-3562-424-0
Complete FF Idler Ass'y
3-140-194-XX
Spring (32T)
3-562-458-00
Gear (L)
E 1.5
X-3562-419-0
Complete Reel Spindle Ass'y
3-562-457-00
Gear, cam
E 2
1-454-204-00
Solenoid, tape direction change (PM601)
3-489-310-XX
Spring (26T)
♠ X-3562-406-0
Lever Ass'y, slide; head base
P 2.6 x 3
P 2.6 x 3
E 1.2
♠ X-3562-403-0
Cam Ass'y
PTT 2.6 x 4
3-562-459-00
Pulley, FWD
3-446-154-XX
Spring (16T)
♠ X-3562-402-0
Lever Ass'y (R), FWD
X-3562-426-0
Lever Ass'y, FR
♠ 3-401-179-00
Clamper, lead
3-531-869-XX
Spring (54T)
E 1.5
E 1.2
PS 2.6 x 4
3-562-483-00
Spring, FR
3-562-459-00
Pulley, FWD
3-539-234-00
Spring
♠ X-3562-410-0
Lever Ass'y (L), FWD
P2 x 2.5
♠ X-3562-432-0
Lever Ass'y, eject
P 2 x 4
P 2 x 4
3-566-305-00
Knob, eject
3-831-441-XX
Cover, eject (t0.5)

SECTION 6
ELECTRICAL PARTS LIST

SEMICONDUCTORS

Transistors

Ref. No.	*Part No.*	*Description*
Q101, 201 Q102, 202 Q401–404	8-729-663-47	2SC1364
Q405	8-729-612-77	2SA1027R
Q406, 407	8-760-335-10	2SC1474
Q408, 601	8-719-663-47	2SC1364
Q602, 603	8-760-335-10	2SC1474

ICs

Ref. No.	*Part No.*	*Description*
IC101	8-759-110-32	μPC1032H
IC102	8-759-312-26	HA11226
IC401, 601	8-759-145-58	μPC4558C
IC603	8-750-690-00	CX069

Diodes

Ref. No.	*Part No.*	*Description*
D101, 201	8-719-422-21	1T22AM
D102, 202 D103, 203	8-719-815-55	1S1555
D301	8-719-200-02	10E2
D302, 401 D402	8-719-815-55	1S1555
D403	8-719-139-07	RD3.9E
D404	8-719-815-55	1S1555
D405	8-719-200-02	10E2
D601, 602	8-719-815-55	1S1555
D603–605	8-719-200-02	10E2
D606	8-719-139-07	RD3.9E
D607	8-719-191-07	RD9.1E
D801, 802	8-719-900-96	GL9NG6
D803	8-719-900-21	GL2HY1
PUT601	8-729-101-31	N13T1
SDME1, 2	8-745-101-01	DM101A

CAPACITORS

All capacitors are omitted. Refer to the lists on pages 88 and 89 for their part numbers.

RESISTORS

Common resistors are omitted. Refer to the list on the last page for their part numbers. kΩ : 1000Ω

Ref. No.	*Part No.*	*Description*
R618	1-246-848-00	2.4kΩ 1/8W carbon
R619	1-246-860-00	24kΩ 1/8W carbon
RV101,201 RV301	1-226-431-00	10kΩ, adjustable; playback level, DOLBY NR
RV401,402 RV404,405	1-226-562-00	50kΩ-A x 4, variable; TREBLE, BASS
RV403,406 RV407	1-226-561-00	20kΩ-A x 2/100kΩ-W, variable; with switch; VOL, BALANCE
RV601	1-226-237-00	20kΩ, adjustable; tape speed

MISCELLANEOUS

Ref. No.	*Part No.*	*Description*
♠CNJ2	1-555-295-00	Cord, with 5p-connector
♠CNJ3	1-555-294-00	Cord, with 10p-connector
HP901	8-829-341-00	Head, playback; PP176-3604D
M601	8-835-027-01	DC Motor, DNF-2800A
PM601	1-454-204-00	Solenoid, tape direction change
RY401	1-515-334-00	Relay, tuner/tape change
S401	————	included in RV403, 406, 407
S901	1-552-931-00	Switch, pushbutton; DOLBY NR
S902	1-552-909-00	Switch, pushbutton; TAPE SELECT
S903	1-553-100-00	Switch, key-board; DIRECTION
S904	1-552-912-00	Switch, leaf; muting
S905	1-552-664-00	Switch, micro; motor power
S906	1-552-911-00	Switch, slide; playback head select

Note: Items marked "♠" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Ref. No.	*Part No.*	*Description*
	COMPLETE CIRCUIT BOARD	
	🌢 A-3270-028-A	EQ AMP
	🌢 A-3279-066-A	Servo AMP
	🌢 A-3281-073-A	AF AMP
	PRINTED CIRCUIT BOARD	
	🌢 1-588-542-00	Head
	🌢 1-588-746-00	DME
	🌢 1-600-576-00	LED (DOLBY NR)
	🌢 1-600-577-00	LED (DIRECTION)
	🌢 1-600-579-00	Switch
	🌢 1-603-520-00	Head Select Switch

ELECTROLYTIC CAPACITORS

	RATING				→ : Use the high voltage rated one.	
CAP. (µF)	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00
1.0					→	1-121-391-00
2.2					→	1-121-450-00
3.3	→	→	→	1-121-392-00	→	1-121-393-00
4.7	→	→	→	1-121-395-00	→	1-121-396-00
10	→	→	1-121-651-00	1-121-398-00	→	1-121-738-00
22	→	→	1-121-479-00	1-121-480-00	1-121-662-00	1-121-152-00
33	→	→	1-121-403-00	1-121-404-00	1-121-652-00	1-121-405-00
47	→	1-121-352-00	1-121-409-00	1-121-410-00	1-121-653-00	1-121-411-00
100	→	1-121-414-00	1-121-415-00	1-121-416-00	1-121-357-00	1-121-417-00
220	1-121-419-00	1-121-420-00	1-121-421-00	1-121-422-00	1-121-261-00	1-121-423-00
330	1-121-751-00	1-121-805-00	1-121-521-00	1-121-654-00	1-121-655-00	1-121-656-00
470	1-121-424-00	1-121-425-00	1-121-426-00	1-121-733-00	1-121-361-00	1-121-810-00
1000	–	1-121-736-00	1-121-245-00	1-121-657-00	1-121-388-00	1-123-061-00
2200	1-121-658-00	1-121-659-00	1-121-660-00	1-123-067-00	1-121-984-00	–
3300	1-121-661-00	1-123-075-00	1-123-071-00	–	–	–

CAP. (µF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	–	–	–	–
1.0	1-123-249-00	1-123-252-00	1-123-003-00	1-121-168-00
2.2	1-123-250-00	1-123-026-00	–	1-123-028-00
3.3	1-121-995-00	–	1-123-004-00	1-123-006-00
4.7	1-123-255-00	1-121-246-00	1-121-759-00	1-123-007-00
10	1-121-126-00	1-121-999-00	1-123-254-00	1-123-008-00
22	1-121-996-00	1-123-253-00	1-123-005-00	1-123-022-00
33	1-121-997-00	1-121-757-00	–	–
47	1-123-251-00	1-121-919-00	–	–
100	1-123-084-00	–	–	–

CERAMIC CAPACITORS

			RATING				
CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (µF)	50 VOLT.
	PART No.		PART No.		PART No.		PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001µF = 1,000pF

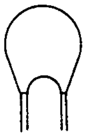
CERAMIC (SEMICONDUCTOR) CAPACITORS

			RATING	→ : Use the high voltage rated one.	
CAP. (µF)	25 VOLT.	50 VOLT.	CAP. (µF)	25 VOLT.	50 VOLT.
	PART No.	PART No.		PART No.	PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

MYLAR CAPACITORS

CAP. (µF)	RATING			CAP. (µF)				CAP. (µF)			
	50 VOLT.	100 VOLT.	200 VOLT.		50 VOLT.	100 VOLT.	200 VOLT.		50 VOLT.	100 VOLT.	200 VOLT.
	PART No.	PART No.	PART No.		PART No.	PART No.	PART No.		PART No.	PART No.	PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				

TANTALUM CAPACITORS



→ : Use the high voltage rated one.

CAP. (µF)	RATING						
	3.15 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	25 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.01					→	→	1-131-396-00
0.015						→	1-131-397-00
0.022						→	1-131-398-00
0.033						→	1-131-399-00
0.047						→	1-131-400-00
0.068					→	→	1-131-401-00
0.1					→	→	1-131-402-00
0.15					→	→	1-131-403-00
0.22					→	→	1-131-404-00
0.33					→	1-131-409-00	1-131-405-00
0.47	–	–	–	–	1-131-412-00	→	1-131-406-00
0.68	–	–	–	1-131-415-00	→	1-131-410-00	1-131-407-00
1.0	–	–	1-131-418-00	–	1-131-413-00	→	1-131-408-00
1.5	–	1-131-421-00	–	1-131-416-00	→	1-131-411-00	1-131-348-00
2.2	1-131-424-00	–	1-131-419-00	–	1-131-414-00	1-131-355-00	1-131-349-00
3.3	–	1-131-422-00	–	1-131-417-00	1-131-362-00	1-131-356-00	1-131-350-00
4.7	1-131-425-00	–	1-131-420-00	1-131-369-00	1-131-363-00	1-131-357-00	1-131-351-00
6.8	–	1-131-423-00	1-131-376-00	1-131-370-00	1-131-364-00	1-131-358-00	1-131-352-00
10	1-131-426-00	1-131-383-00	1-131-377-00	1-131-371-00	1-131-365-00	1-131-359-00	1-131-353-00
15	1-131-390-00	1-131-384-00	1-131-378-00	1-131-372-00	1-131-366-00	1-131-360-00	–
22	1-131-391-00	1-131-385-00	1-131-379-00	1-131-373-00	1-131-367-00		
33	1-131-392-00	1-131-386-00	1-131-380-00	1-131-374-00			
47	1-131-393-00	1-131-387-00	1-131-381-00	–			
68	1-131-394-00	1-131-388-00	–	–			
100	1-131-395-00	–	–	–			

TANTALUM CAPACITORS

CAP. (µF)	RATING					
	3 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.033						1-131-273-00
0.047						1-131-274-00
0.068						1-131-275-00
0.1						1-131-276-00
0.15						1-131-277-00
0.22			–	–	1-131-262-00	1-131-278-00
0.33			–	–	1-131-263-00	1-131-279-00
0.47			1-131-169-00	–	1-131-264-00	1-131-280-00
0.68			–	1-131-258-00	1-131-265-00	1-131-281-00
1.0			1-131-254-00	–	1-131-266-00	1-131-282-00
1.5		1-131-250-00	–	–	1-131-267-00	1-131-283-00
2.2		–	–	1-131-259-00	1-131-268-00	1-131-284-00
3.3		–	1-131-255-00	–	1-131-269-00	–
4.7		1-131-251-00	1-131-171-00	–	1-131-270-00	–
6.8		–	–	1-131-260-00	1-131-271-00	–
10	–	–	1-131-256-00	–	1-131-272-00	–
15	–	1-131-252-00	–	1-131-261-00		
22	–	–	1-131-257-00	–		
33	1-131-176-00	1-131-253-00	1-131-173-00	–		
47	1-131-288-00	1-131-174-00	–	–		
100	1-131-177-00					

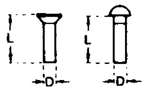
1/4 WATT CARBON RESISTORS

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:

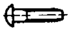
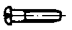
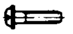
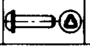
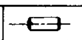
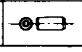
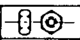
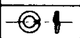
– P 3 x 10
- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only.*
Unless otherwise indicated, it means cross-recessed head (Phillips type).



Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Nut, Washer, Retaining ring:

N 3
- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

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